IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:	Ron McCabe		
Confirmation No.	8995		
Serial No.:	09/438,184	Examiner:	Sean M. Reilly
Filed:	November 11, 1999	Group Art Unit:	2153
For:	FLEXIBLE REMOTE DATA MIRRORING		
Date:	December 4, 2006		

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

RESPONSE TO REQUEST FOR INFORMATION

Responsive to the Request for Information dated September 7, 2006.

Remarks begin on page 2.

An **Appendix** follows the Remarks section.

REMARKS

The Examiner's Request

The Examiner requested:

A) Any manual for the Applicant's Off-SiteServer product that was publicly available one year before the Applicant's filing date.

B) Any other Off-SiteServer product documentation that describes data mirroring and was publicly available one year before the Applicant's filing date.

The Applicant's Response

The Applicant has made a good faith effort to find a copy of a manual for the Off-SiteServer product, however the Applicant was unable to find such a copy.

The Applicant is aware of an Internet website that claims to have stored a copy of the Applicant's website as it existed at various times in 1997. The link to the website is "http://web.archive.org/web/*/http://miralink.com". This link was obtained by typing "http://miralink.com" in the Wayback Machine box on the page located at "http://www.archive.org/web/web.php". Enclosed in the Appendix are printed copies of the website listed under the dates March 31, 1997, April 14, 1997, May 5, 1997, and December 21, 1997. Other documents for other dates are available on the website.

Although the Applicant has provided these documents in response to the Examiner's request for documents publicly available one year before the Applicant's filing date, the Applicant makes no representation that these documents were in fact publicly available one year before the Applicant's filing date. The Applicant is not aware of when these documents were available to the public through the archiving website.

Conclusion

The Examiner is encouraged to telephone the undersigned at (503) 222-3613 if it appears that an interview would be helpful in advancing the case.

Customer No. 20575

Respectfully submitted,

MARGER JOHNSON & McCOLLOM, P.C.

Derek Meeker
Reg. No. 53,313

210 SW Morrison Street
Suite 400
Portland, OR 97204
503-222-3613

MIRALINK™ CORPORATION

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Welcome to MiraLink. We are a worldwide leader in innovative business resumption products such as NLM*Alert*, *Alert!* for Windows NT, Uptime Monitor, and hardware like Off-SiteServer V.35.

MiraLink provides reliable and easy to use products to monitor and restore your system in case of problems or failure. Though unpleasant to imagine, potential destruction of your hardware, software, and data is a undeniable reality. MiraLink is proud to offer its products to serve and protect our clients.

NETSCAPE 2.0 ENHANCED

iCount.com

THIS PAGE HAS BEEN ACCESSED 2826 TIMES.

Support Information

Hours -- 9:00A.M. to 5:00P.M. Mountain Time Monday through Friday
180 South 300 West, Suite #130, Salt Lake City, Utah 84101
Phone -- (801) 575-5465
Fax -- (801) 532-5465
E-mail -- mlink@miralink.com

To receive support by e-mail, please send the following information: Name:

Company Name:

Company address:

Phone:
Fax:
E-Mail address:

Host system configuration:

Manufacturer/Model number:

Hard disk make/model number:

Hard disk partition size:

System memory:

Description of problem:

Remote system configuration:

Manufacturer/Model number:

Hard disk make/model number:

Hard disk partition size:

System memory:

Description of problem:

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MiraLink

CORPORATE INFORMATION

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MiraLink Corporate Information

Founded in April 1994, MiraLink is a worldwide supplier of hardware and software for the client/server market. MiraLink devices, when attached to both primary and standby file servers, enable real-time duplication (mirroring) of mission-critical data at remote locations. MiraLink units keep time-sensitive functions up and running regardless of natural or man-created threats.

Corporate Strategy:
MiraLink's strategy is to provide the premier business continuity/disaster recovery system for PC networks. The Company provides cost-efficient, easy-to-manage products, distinguished by quality and reliability, which maximize data security without denigrating network performance.

Corporate Headquarters:
180 South 300 West
Salt Lake City, Utah 84101
Phone: 1 801 575-LINK (5465)
Fax: 1 801 532-LINK (5465)
mlink@miralink.com

Press Contact: Sheli Sillito
Marketing and Communications
(801) 575-LINK (5465)

Financing:
MiraLink is a privately held company, backed by venture financing.

Please note: MiraLink (and Off-SiteServer) are trademarks of MiraLink Corporation. All other brand and product names mentioned herein are trademarks or registered trademarks of their respective holders.

Market Category:
MiraLink and its products provides services in the business continuity/disaster recovery market -- specifically, in the remote back-up market.

Product:
MiraLink has the only patented technology which, in a cost-effective and practical manner, enables disaster recovery of critical data at the network operating system level.

For years, mainframe computer MIS managers have taken the availability of remote backup and security of their companies data for granted. MiraLink products bring this functionality -- and resulting peace of mind -- to the PC LAN market by making real-time remote mirroring for Novell LANs possible.

The standard Off-SiteServer V.35 (configuration consists of a pair of rack-mountable devices, interface cables, Vinca StandbyServer 32 link cards, and software.

The foundation of the system is the disk mirroring

function (SFTII) of Novell"s NetWare (versions 3.12 and 4.1 work best and are highly recommended). Physically, MiraLink products are a combination of software and hardware contained in a pair of Off-SiteServer V.35 units. Each of these is connected to a Vinca StandbyServer disk driver and link card, one in the company's main Novell NetWare server and the other, off-site, in the NetWare standby server. Vinca's product in the main server removes the mirrored disk from the host system and places it in a standby "warm" server, hence the same "StandbyServer."

MiraLink's Off-SiteServer V.35 unit adjacent to the host system essentially intercepts the Vinca link card information and prepares it for transmission across a low bandwidth communications channel. At the standby site, the remote Off-SiteServer V.35 receives and restores the data to its original format and then transfers it to the actual standby server. From the Novell and Vinca standpoints, the Off-SiteServer V.35 system become transparent. The only significant difference is that the MiraLink products enable the functionality to be accomplished at a remote location up to thousands of miles away.

Communications Interfaces:

The V.35 output of the Off-SiteServer units provides a number of options for a company's communications channel interface. Through an external CSU/DSU or router compatible bridge, these units can interface to: ATM, T1/E1, fractional T1/E1, ISDN, frame relay ethernet, FDDI, token ring, etc. Twisted pair connections up to 5,000 feet are also supported.

Product Benefits:

MiraLink's primary product benefits can be summarized as follows:)1 continuous mirroring to the last transaction prior to primary file server failure; 2) activation of the standby server within minutes of primary server failure or destruction; 3) accommodating multiple communication protocols; and 4) enabling the use of low-bandwidth links to reduce recurring communication costs.

In addition, MiraLink's system does not require network users to log off the network. It inhibits disk reads, thus reducing traffic and improving network performance. It minimizes dirty cache buffers/outstanding disk requests and maintains LAN performance. Finally, it has a user-friendly menu-based touchpad plus LCD and LED displays for diagnostic information and easy network administration/control.

Likely Purchasers:

Any business that runs on a Novell PC LAN and which has continuously-updated, mission-critical data is a logical prospect for MiraLink's Off-SiteServer system.

The need for PC LAN "electronic vaulting" (real-time data duplication) may stem from any one of -- or a combination of -- the following: a corporate policy regarding risk exposure; downsizing from mainframe computing; national disaster recovery regulation compliance; the threat of physical interruptions such as electric power disturbances or natural and weather-related disasters; or the possibility of acts of sabotage or vandalism.

MiraLink's products are most appropriate in situations

where the cost to protect against the loss of electronic data, while not insignificant, is inconsequential in comparison to the cost to replace potentially lost data. Market segments where such a situation exists include -- but are not limited to -- the following:

- data recovery service providers
- banking/financial services
- trading
- insurance
- Federal agencies with regional offices
- airlines/car rental/travel
- telecommunications
- research laboratories

Distribution:

MiraLink currently sells its systems directly and through value added resellers (VARs) and systems integrators.

Sales Offices: Headquarters:

E-mail -- rmccabe@miralink.com

Europe:
Graham Pobjoy
011 44 1344-777006
E-mail -- gpobjoy@miralink.com
European sales manager

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MiraLink Products

Software Products
NLM*Alert*
Alert! for Windows NT
Uptime Monitor

MiraLink provides the following software products to our clients to download in an evaluation version. *After you have downloaded the software, please contact MiraLink for the registration numbers.*

Phone -- (801) 575-LINK (5465)
Fax -- (801) 532-LINK
E-mail -- rmccabe@miralink.com

Supports T1/E1, Frac T1/E1, Ethernet, FDDI, ISDN, Frame Relay, etc.

Retrievable Data in Ready to Use Format.

Uses Low Bandwidth (low cost) Connection.

Compatible with Vinca» StandbyServer» and Snapshot» Products.

Reduces Reliance on Tape Backup Systems.

Off-SiteServer V.35

MiraLink has the only patented technology which, in a cost-effective and practical manner, enables disaster recovery of critical data at the network operating system level.

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Off-SiteServer V.35 Press Comments

Click here for press comments on Off-SiteServer V.35.

Technical Review

Click here for a complete technical review of Off-SiteServer V.35.

Data Sheet

Click here for a data sheet of Off-SiteServer V.35.

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NLM*Alert!*™

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When Superman isn't available...

NLMAlert! for Novell NetWare™ converts system console events into SNMP traps. These traps are received by industry-leading network management consoles. This allows a network manager to view exact errors and events occurring on a NetWare server.

Easy configuration allows monitoring of Service Status(Start/Stop), Memory Events, Connection Status, Directory structure changes, and File System Rights changes. While sending the above mentioned traps, NLMAlert! also creates a viewable NLMAlert! log file and .INI file. Novell console messages can be remapped as unique traps. NLM List Tracking will monitor all list NLM's that are loaded. The above features plus many common NetWare console error messages are available in an industry-standard HP OpenView compatible trap definition file (TDF) file.

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When Superman isn't available...

Thank you for your interest in MiraLink's **NLM*Alert!***. To serve you better we manually proccess each request. Please provide the information requested below. Your trial serial number will be e-mailed to you shortly pending verification.

* Denotes Required Fields -- All Other Information Optional

* Name:
Title:
Organization:
* Street Address:
* City:
* State: * Zip/Postal Code:
Country:
* Phone: Country Code
Area Code
Fax: Country Code
Area Code
* Email:

1. Select the industry that best represents your company's business:

- Banking/Financial
- Gas/Oil
- Manufacturing
- Service
- Utilities
- Reseller/VAR
- Computer Hardware
- Government
- Medical/Healthcare
- Software
- Education
- Telecommunications
- Insurance
- Military
- Systems Integrator
- Entertainment
- Law
- Other

2. Where did you hear about MiraLink's Products?

- Advertisement
- Trade Show
- Referral
- Card Deck
- Web Search
- Seminar
- Direct Mail
- Other

3. What Products are you interested in?

- Uptime Monitor
- *Alert!* for Windows NT
- NLM *Alert!*

4. Please indicate the products that you are using or plan to implement:

Novell NetWare: Number of Servers you want to monitor:

Microsoft NT: Number of Servers you would like to monitor:

Microsoft NT: Number of Workstations you would like to monitor:

IP/IPX:

5. What network management tools are you currently using?

- ○ Uptime Monitor *by MiraLink Corporation*
- ○ AlertPage *by Geneva Software*
- ○ CiscoWorks *by Cisco*
- ○ Command Post *by Boole & Babbage CA*
- ○ ManageWise *by Novell*
- ○ OneVision *by Lucent Technologies*
- ○ OpenView *by Hewlett Packard*
- ○ Optivity *by Bay Networks*
- ○ Spectrum *by Cabletron*
- ○ Unicenter TNG *by Computer Associates*
- ○ TME *by Tivoli / IBM*
- ○ What's Up Gold *by Ipswitch*
- ○ Transcend *by 3Com Communications*
- ○ VantagePoint *by Storage Dimensions*

What are your plans for implementation?

- ○ Now
- ○ 1-3 Months
- ○ 4-6 Months
- ○ No plans, just gathering information.

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Highlights

for NLM*Alert!*™

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Here are a few key highlights of NLMAlert!'s advanced NetWare Management System (NWMS).

When Superman isn't available...

- Easily installs in under one minute!
- Customizes or configures easily
- Converts all Netware server console messages into SNMP traps
- Provides detailed information on:

•File server status	•NLM status (loaded/unloaded)	•NLM resource leaks
•NLM processors hogs	•LAN driver loading/unloading	•File server shutdown
•Cache memory events	•Memory allocation events	•Packet buffer events
•Connection status	•Log-in / log-out status	•Watchdog time-outs
•Intruder detection	•Bindery manipulation	•Bindery Open/Close
•Security rights changes	•Out of connections	•File system status
•Volume mount status	•TTS shutdown	•Directory structure changes
•File system rights changes	•Data migration events	

- Compatible with industry leading network management consoles including:

•Uptime Monitor by MiraLink	•AlertPage by Geneva Software
•CicsoWorks by Cisco	•Command Post by Boole & Babbage CA
•ManageWise by Novell	•OneVision by Lucent Technologies
•OpenView by Hewlett Packard	•Optivity by Bay Networks

- Solstice Enterprise Manage by Sun Microsystems
- Spectrum by Cabletron
- TME by Tivoli / IBM
- Transcend by 3Com Communications
- Unicenter TNG by Computer Associates
- VantagePoint by Storage Dimensions
- What's Up Gold by Ipswitch

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Features

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When Superman isn't available...

Key features of NLMAlert! by MiraLink:

- Monitors a wide range of system conditions
- Generates 100% standard SNMP Alarms (TRAPs)
- Customizes and configures easily
- Compatible with industry-leading network management consoles like Uptime Monitor
- Supports all console messages

With the implementation and roll-out of advanced network management systems it is becoming more and more important to be aware of changes as they occur within network devices. SNMP has become a de-facto standard for monitoring and making changes in network devices over the last several years. However due to the lag in vendor support, or excessive expense, many critical network components still do not yet support SNMP. NLMAlert! is designed to address several areas of management within your Novell NetWare file server to assist you in being more aware of the file server configuration and operation.

Important facts about NLMAlert! by MiraLink:

1. NLMAlert! is a NetWare Loadable Module (NLM):

- Written in C++
- Versions for NetWare v3.1x and v4.1x
- Uses Standard Novell TCP/IP Protocol Stack
- Generates 100% Standard SNMP TRAPs
- Will Log TRAPs to a local log file
- Easy to customize and configure
- Each TRAP can be individually enabled/disabled

2. SNMP TRAPs Generated by NLMAlert! are:

- File Server Status
- NLM Status (Loaded/UnLoaded and Required Configuration)
- NLM Resource Leaks
- NLM Processor Hog
- File Server Console Security

- File Server Time Changes
- Protocol Stack Binding/UnBinding
- LAN Driver Loading/UnLoading
- File Server Shutdown
- Cache Memory Events
- Memory Allocation Events
- Packet Buffer Events
- Lost Interrupts
- User and Connection Status
- Connection Status
- Login/Logout Status
- Watchdog Timeouts
- Intruder Detection
- Bindery Manipulation
- Bindery Open/Close
- Security Rights Changes
- Out of Connections
- File System Status
- Volume Mount Status
- TTS Shutdown
- Directory Structure Changes
- File System Rights Changes
- Data Migration Events
- All File Server Console Messages
- Any NLM console message can be sent as a TRAP

3. Novell console messages can be remapped as unique TRAPs

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When Superman isn't available...

Press Comments

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MiraLink™ Corporation Wins Excellence in Networking Award

MiraLink was recently awarded the prestigious Excellence in Networking Award from ProductReviews.com. ProductReviews.com ran our products through rigorous testing, and found them to be "extremely useful utilities at an attractive price". Here's what they had to say about NLMAlert!:

"NLMAlert! runs as an NLM on a NetWare file server. We found a handful of useful events it could monitor, in addition to the critical system events. For example, it can notify you if the server keyborad has been used in addition to whether critical server volumes have been dismounted. It takes only a few minutes to install NLMAlert!. Once installed and loaded, this NLM is simple to configure from the server console".
- Dennis Williams, ProductReviews.com

See Remainder of Article

Monday, May 4, 1998 - **MiraLink Introduces NLMAlert!**

Salt Lake City -- MiraLink Corp., a maker of disaster-recovery products, now is offering VARs a network-management solution for Microsoft Corp.'s Windows NT and Novell Inc.'s NetWare, as well as a remote-mirroring application.
See Remainder of Article

Low-Cost Net Tune-Ups -- Managing your network for less than the big guys pay
Cassimir Medford

Benjamin Ruffin thinks he has seen it all. He has spent the past eight years taking the pulse of sick networks and looking for signs that the healthy ones may be coming down with something. Over the years, those networks have varied in sophistication. Ruffin worked as a network manager in MCI's network management center in Reston, Va., for approximately four years, monitoring the behavior of T-1s and fiber optic networks. Today, he monitors the behavior of small local area networks in the Salt Lake City area. "The scale may be different, but the job is the same," says Ruffin. "My current job allows me to deliver network management without asking the end user to make a costly investment in products,

training and implementation time."
See Remainder of Article

MiraLink Introduces NLMAlert!
Real-time Monitoring of File Server Console Messages

For Immediate Release

Monday, May 4, 1998
Salt Lake City, Utah -

MiraLink Corporation, a leading supplier of network management and business continuity (disaster recovery/fault tolerance) products, announces NLMAlert, a network management software application that makes Novell NetWare server console messages SNMP enabled. Most error and notification messages posted to the NetWare server console go unnoticed by network administrators. Even though NetWare provides a way to store such messages in an error log, this log is typically only viewed after a critical error has occurred. NLMAlert warns network administrators in real-time of errors or other messages posted to the NetWare server console.

"Most NetWare servers are locked away in secure server closets, preventing the server console from being monitored. But even when servers are easily accessed, messages sent to the server console often scroll off the screen before the network administrator has a chance to view them," said Ron McCabe, president and CEO of MiraLink Corporation. "NLMAlert is the first product of its kind to make NetWare's server console messages SNMP enabled. As soon as an error is sent to the NetWare server console, NLMAlert! converts the messages into SNMP traps, filters out the non-essential messages, and sends the crucial errors to the network management console. And, with MiraLink's Uptime Monitor, the network administrator can be notified of these events via pager, E-mail, PCS phone, workstation alarm, or sound file. This allows a single network administrator to manage and monitor the health of a large number of NetWare servers proactively, rather than reactively.

Compatibility and support
NLMAlert! supports any existing SNMP management console that may already be used by network administrators. However, for companies with no such management software in place, MiraLink offers Uptime Monitor, an affordable and easy to use management console for receiving all SNMP traps generated on the network.

Pricing and availability
NLMAlert! is currently available directly from MiraLink at a US list price of $295 per server. NLMAlert! is also available through authorized MiraLink resellers. A fully-functioning evaluation version can be downloaded from the MiraLink website at http://www.miralink.com.

About MiraLink

MiraLink is a worldwide leader in innovative network management and business resumption products. MiraLink news, product, and sales information is available on the World Wide Web at http://www.miralink.com. MiraLink Corporation is headquartered

in Salt Lake City, Utah.

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ProductReviews.com gives Excellence In Networking award to Uptime Monitor, NLMAlert!, and Alert! for Windows NT

Network administrators always find out about the health of their servers one way or another. But the proactive administrator finds out directly from the server, while the reactive one finds out from enraged users. MiraLink Corp. has released a suite of network management tools that help network administrators keep on top of their servers and manage them proactively. This suite consists of three products:

Uptime Monitor is a simple network management console that receives messages from NLMAlert! and Alert! for Windows NT. In fact, it can receive messages from any SNMP-enabled devices on the network. Uptime Monitor will initiate an alarm when thresholds are exceeded, errors are generated, or monitored network elements do not respond to polling. Uptime Monitor runs on Windows 95 or Windows NT systems, and can notify network administrators of errors via email, a pager, etc.

NLMAlert! is a NetWare Loadable Module (NLM) that monitors over 60 error or status messages generated by NetWare, as well as any messages sent to the server console. When an error or event occurs, instead of being lost in a log file or displayed on the console, NLMAlert! sends the error messages across the network to Uptime Monitor. You can select which errors or events you want to be notified of, and Uptime Monitor will notify you of the server status.

Alert! for Windows NT runs as a Service on Windows NT and monitors over 500 system events. Most of these events are logged and can be viewed from the server using NT's Event Viewer utility. However, Alert! for Windows NT receives these events and sends them to Uptime Monitor, which will notify you of critical errors or events that require immediate attention. There is a version for both NT Server and NT Workstation.

Uptime Monitor

This utility's most attractive feature is its simplicity. Unlike other

popular management platforms and applications that exist, Uptime Monitor doesn't encumber you or your system with unwanted or unused features. It is simply a console that receives SNMP traps and offers a variety of notification methods to alert you of critical events. It requires few resources and can sit quietly in the background until it is needed.

It took us only a few minutes to install Uptime Monitor on Windows 95, at which time it immediately recognized several devices on our test network generating SNMP traps. We liked the ability to import Trap Definition Files (TDFs), which are files used to define traps from specific applications or devices. For example, when using Uptime Monitor with NLMAlert!, you can import the TDF which translates the cryptic SNMP messages into an understandable format.

NLMAlert!

NLMAlert! runs as an NLM on a NetWare file server. It supports NetWare versions 3.11 through 4.11, but requires that your server be patched with the latest updated files. It also requires that you have TCP/IP loaded and running on your server. We found a handful of useful events it could monitor, in addition to the critical system events. For example, it can notify you if the server keyboard has been used in addition to whether critical server volumes have been dismounted.

It takes only a few minutes to install NLMAlert!, and requires that you have admin rights to do so. Once installed and loaded, this NLM is simple to configure from the server console. A list of events is displayed and you can select or deselect which ones you want monitored.

Alert! For Windows NT

Checking the pulse on your NT systems, whether Server or Workstation, is simple with Alert! For Windows NT. We found that we never had to use Event Viewer to know what was going wrong with our NT servers. We configured Alert! For Windows NT to monitor only the critical events, using exclusion filters to eliminate unwanted events from being monitored. Alert! For Windows NT works with NT version 3.51 or later, and you need to apply the latest Service Pack. It is also important to note that a separate version exists for NT Server and NT Workstation.

We installed Alert! For Windows NT on a test server, which requires administrative access to the server. The hardest part about configuring it is understanding what events you want to monitor. One drawback to this product is that, because of the way NT works, a TDF file cannot be imported. But that's a shortcoming of NT and not Alert! For Windows NT.

-- Dennis Williams ProduetReviews.com

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BACK

When Superman isn't available...

NLMAlert! is easy to use and installs in under one minute! NLMAlert! converts NetWare console messages into Simple Network Management Protocol (SNMP) traps. These traps are received by industry leading network management consoles such as:

- Uptime Monitor from MiraLink Corporation
- AlertPage from Geneva Software/Denmac Systems
- Unicenter TNG from Computer Associates
- CiesoWorks from Cisco
- Command Post from Boole & Babbage
- ManageWise from Novell
- OneVsion from Lucent Technologies
- OpenView from Hewlett Packard
- Optivity from Bay Networks
- Solstice Enterprise Manage from Sun Microsystems
- Spectrum from Cabletron
- TME from Tivoli / IBM
- Transcend from 3Com
- VantagePoint from Storage Dimensions
- What's Up Gold from Ipswitch

This allows a network manager to view exact errors occurring on a NetWare Server. Easy configuration allows monitoring of File Server Status (Start/Stop), NLM Status (Loaded/Unloaded and required configuration), NLM Resource Leaks, NLM Processor Hog, File Server Console Security, File Server Time Changes, Protocol Stack Binding/Unbinding, Lan Driver Loading/Unloading, File Server Shutdown, Cache Memory Events, Memory Allocation Events, Packet Buffer Events, Log-in/Log-out, Connection Status, Intruder Detection, Bindery Manipulation, Bindery Open/Close, Security Rights Changes, Out of Connection, Data Migration Events, File System Status, Volume Stats, Directory Structure Changes, and File System Rights Changes. While sending the above mentioned traps, NLMAlert! also creates a viewable NLMAlert! log file and .INI file. Novell console messages can be remapped as unique traps. NLM List Tracking will monitor all list NLM's that are loaded. The above features plus many common NetWare console error messages are available in an industry-standard HP OpenView compatible trap definition file (TDF) file.

Full name of product:	***NLMAlert! for NetWare 750NLM***
Platform:	***NetWare 3.11 or later***

Required NLM's	***TCP/IP.NLM Version 2.02i or later*** ***SNMP.NLM Version 2.08 or later***
Version number:	***Version 1.5***
Price (US funds):	***$295.00 per Server***

Server requirements:

- ***200Kb of file server memory (RAM)***
- ***75 Kb free disk space***

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info@miralink.com

Press Comments

Off-SiteServer V. 35

NetWare File Server Mirroring Over High Speed Communication Links

"Having a mirrored NetWare server next to your main machine will be of enormous benefit should your main server fail. But it the building catches fire, or the roof collapses, both servers will be destroyed. If it's essential to get your company up and working immediately after a total disaster, you're going to have to create a complete office environment at a remote site. MiraLink's Off-SiteServer V.35 can help you do just that.

"Off-SiteServer is aimed at companies that can't afford to lose business due to fire, flood and other catastrophes. It's not cheap, but it it's the difference between going out of business and surviving, cost won't be an issue. "
Louise Lindop *PC Magazine UK July, 1996*

"Because MiraLink's Off-SiteServer buffers the data, such low-speed WAN links as 56k bps, ISDN or fractional T-1 lines may be used. Therefore, cheaper WAN connections can quickly pay back the cost of the expensive MiraLink hardware. Enterprises with infrequent but massive spikes of data mirroring, such as with database downloads, do not need high WAN bandwidth for Off-SiteServer.

"Just for kicks, we vandalized the WAN link (by pulling out a cable) to see what Off-SiteServer would do. It merely noted that the link was down and continued to buffer the data. We even swapped a 56K bps link for a T-1 in midstream, then back again, with no ill effects. We were impressed." **"Skirting Server Disaster" Ken Phillips** *PC Week June 17, 1996*

"Off-SiteServer provides NetWare installations with a unique way to distribute server tolerance across the wide area network, using anything from analog dial-up lines for near-real-time backup to T-1 links for actual server mirroring. By enabling centralized backup of multiple remote sites and protecting users from disasters at a particular location, Off-SiteServer makes the PC-LAN environment a more robust platform for business-critical applications."
Susan Breidenback *Editor in Chief LAN Times April, 1995*

"For network managers, ensuring server uptime is the chief challenge of their jobs: natural disasters, criminal acts, human error, parts failures and just plain bad luck can all bring a network to a crashing halt. For peace of mind and complete protection...the most thorough solution is to clone a vital server, either across the campus for local fault tolerance or off-site for full-blown disaster recovery.

"MiraLink Corp., maker of the WAN-based

Off-SiteServer V.35, solves the WAN bandwidth problem by first buffering all mirror requests to a large hard disk in MiraLink's box. Even if the WAN link fails, mirroring can still occur at top speed as a local disk mirror. The buffer also makes it possible to use low-speed WAN connections, down to 56k bps, thereby saving money on the corporate communications bill."
"For safety, nothing beats server cloning" *Ken Phillips PC Week June 17, 1996*

"If you could foresee a disaster coming to your customer's network, would you: a) make sure all the backups were done and bring a set of archive tapes off-site; b) install a standby server in a mirrored configuration; or c) install a standby server in a mirrored configuration at your own office and let it work remotely?

"If you think the third option sounds good, check out Off-SiteServer V.35, a solution developed by MiraLink in conjunction with Vinca and Novell. Off-SiteServer V.35 lets you build a mirrored file server environment using telecom channels or routable protocols. Building such an environment is not as tricky--or costly--as you might think."
"Stand By, Remotely" *Dave Brambert Network VAR January, 1996*

"MiraLink's Off-SiteServer works with Vinca's StandbyServer hardware and software to allow the remote server to be a distant site. That capability is 'particularly attractive for disaster-recovery purposes,' say Robert Janusaitis, a consultant with BSG Consulting in Houston. 'After the World Trade Center (bombing), a lot of people will want this capability,' adds Paul Mason, research mgr., system level software at International Data.
"NetWare: Higher Availability at Lower Cost" Paul Strauss *Datamation Nov. 15, 1994*

"Off-SiteServer includes software and two rack-mountable units. One unit remains at the host site and is connected to the second, a remote unit, via a dedicated T1 or E1 telephone line, making the system safe from any disaster that may befall the host area. 'Right now there are a lot of mainframe and minicomputer products that do what this does, but Off-SiteServer is relatively unique in a LAN environment,' said Jim Greene, an analyst with IDC Strategic Decisions, in Norwell, Mass."
"MiraLink Mirrors Servers for Real-time Access" Cate T. Corcoran *Info World September 19, 1994*

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Technical Review

MiraLink (Off-SiteServer V. 35)

NetWare File Server Mirroring Over High Speed Communication Links

OVERVIEW

Off-SiteServer V.35 is a sophisticated system designed to enable disk mirroring on a real-time basis, over standard communication lines. The two foundations of the system are: Novell NetWare, specifically the proven and reliable disk mirroring function (SFTII) therein; and Vinca's StandbyServer 32 product.

Vinca's StandbyServer 32 takes advantage of the numerous features and strengths of NetWare disk mirroring and has provided a value-added benefit to NetWare by removing the mirrored disk from the host system and placing it in a standby "warm" server; hence the name "StandbyServer." The standby server, at a minimum, must be capable of running NetWare and have at least the amount of disk space as will be mirrored to it from the primary server.

The StandbyServer 32 product consists of: a disk driver; pseudo disk controllers, or "link" cards, installed in both the primary and standby servers; and a file management system in the form of an NLM, loaded on the standby server. The primary server is set up as if it has two mirrored local partitions (NetWare restricts all mirroring to a partition level). In reality, one of those partitions is located in the standby server. The Vinca software/hardware combination on the primary server acts as a disk interface system. However, rather than porting the data directly to a local drive, it transfers it out through its internal link card and into the standby server link card. The NLM running on a limited version of NetWare on the standby server ensures that the disk write information is placed on its disk system.

When this setup has been implemented and the primary server fails, the standby server can become the active server, with completely up-to-date file information, in a matter of minutes. It accomplishes this by downing the limited NetWare system and then activating the duplicated "real server".

The connection between the link cards of the NetWare server and the standby server is made with a custom, high-speed interface cable. Though performance with this configuration is quite good, the distance limitation of 25 to 50 feet becomes a severe drawback to many potential clients. These clients recognize that a disaster that affects the primary server can all too easily also affect the back-up in the same location. Therefore, to avoid this, they view off-site disaster prevention and recovery as a prime requirement.

The Off-SiteServer V.35 Solution

The Off-SiteServer V.35 system essentially intercepts the Vinca link card information and prepares it for transmission

across any one of a number of standard communications channels. At the standby site, Off-SiteServer V.35 receives and restores the data to its original format, then transfers it to the actual standby server. From both the Novell and Vinca systems' standpoints, the Off-SiteServer V.35 system becomes transparent. From the clients perspective, however, the difference is substantial because the backup is no longer limited to a server located a few feet away from the primary server. Now, the two servers can be separated by hundreds or even thousands of miles.

The Off-SiteServer V.35

The Off-SiteServer V.35 units in the system are identical as far as hardware is concerned, allowing swapping of the local (primary) and remote (secondary) units, if necessary. Because of software differences between the two sites, a menu function allows the administrator to select either "Local" or "Remote." The system hardware consists of two 2U rack mount boxes. Each one incorporates: a keypad; 4-line LCD; a sophisticated multi-processing system; a V.35 interface a power supply; and a hard disk drive.

Local Off-SiteServer V.35

The local Off-SiteServer V.35 unit performs the vast majority of tasks between the two sites. The Vinca link data, which is intercepted in the form of four serial links transmitted in parallel, must be correlated and eventually converted into a single serial stream. This converted data is then immediately stored to an internal1.2 gigabyte NVB (Non-Volatile Buffer). Following a write to the NVB, Off-SiteServer V.35 will acknowledge the successful receipt of the write packet to NetWare through the Vinca subsystem, allowing NetWare to clear the outstanding packet from its internal cache and transmit the next write packet. It then becomes the responsibility of the Off-SiteServer V.35 to ensure the delivery of all packets stored on its internal NVB.

Off-SiteServer V.35 incorporates a V.35 standard interface which accepts complete packets from the main processor section for transmission to a CSU/DSU (Channel Service Unit/Data Service Unit) or other V.35 compatible equipment. This router is located externally to the Off-SiteServer V.35 unit. Packet integrity between the two Off-SiteServer V.35 units is ensured through the use of a 32 bit CRC (Cyclic Redundancy Check). The CRC is generated at the local site and checked at the remote site. If a corrupt packet is detected at the remote site, the local Off-SiteServer V.35 will retransmit the information from its NVB.

Remote Off-SiteServer V.35

The remote Off-SiteServer V.35 unit receives the incoming disk data through its connected CSU/DSU device and prepares it for transmission to the standby server link card. Its primary tasks include: the conversion of a single serial link to the four link system used by Vinca; and notification to the local site that the data was successfully received. Except when processing read requests (see below), the NVB on the remote system usually remains inactive.

Read vs. Write

One of the normal benefits of NetWare mirroring is that

NetWare will use any or all of the mirrored drives when processing read requests. That is, when NetWare obtains a read request from a system user it will use the best available drive (as determined by its own algorithm) to process that request. When numerous read requests are presented, those read requests are typically split up among the mirrored drives. This is commonly referred to as NetWare's "split-seek" function.

Unfortunately, the split-seek feature becomes a severe hindrance to the mirrored drive system when one of the mirrored drives is located off-site. Read requests can take much longer to process, resulting in a potentially significant performance loss. To avoid this possibility, MiraLink provides an NLM (NOSPLTSK.NLM) which disables the split-seek capability of NetWare versions 3.12 and 4.1. Its use is highly recommended.

Even with the NLM loaded there will be occasional read requests given by the local server. In general, when this occurs, the remote Off-SiteServer V.35 unit must duplicate the actions normally only seen in the local unit. That is, it must store the read information to its NVB, attach a checksum, transmit the data through the CSU/DSU, etc. Herein lies the essence of the Off-SiteServer V.35 technology.

The difficulty arises when the requested data is still found on the local NVB. That is, when the requested data has not yet been transferred across the link to the standby server. Because of this possibility, a table of "sector references of data not yet transmitted" is kept on the local NVB. When a read request is received by the local Off-SiteServer V.35, the system first checks this table to see if the requested data may still be on the NVB. If this is the case, the data is simply read locally and no request is made to the standby server.

NVB and SmartAck

Users need to understand that when NetWare is presented with data to save to disk, it first places that data into its own cache memory (in the server). As soon as the disk drive system is available, the "saved" data is transferred out of cache and onto the disk drive system. Cache memory, used for the temporary data "holding tank", is considered "dirty" during the transition. Any data located in "dirty" cache is vulnerable to loss should a server failure occur.

NetWare maintains a very close synchronization between mirrored drives, allowing them to be out of sync only to the limit set in the "Concurrent Mirror Requests" parameter. Even with this set at its maximum limit (this depends upon the NetWare version and block size used), the disparity between mirrored drives will not exceed one or two megabytes. Typically, it will be much less than this. The net result is that the slowest drive in the system will determine the rate at which data is transferred out of dirty cache and into the disk drive system. Therefore, a slow drive increases the probability of increased dirty cache and, consequently, the probability of data loss should a system failure occur.

To combat such exposure, the NVB and SmartAck (Smart Acknowledgment) systems in the Off-SiteServer V.35 work in harmony to reduce dirty cache buffer buildup. The Off-SiteServer V.35 unit appears to NetWare to be a local disk system by storing and then immediately acknowledging all write request packets.

Data In vs. Data Out
Generally speaking, the administrator will want to design this system so that the communications channel chosen will support the "normal" (average) flow of disk write information to be transmitted. That is, should the system experience disk write activity of 300 Megabytes per hour, a T1 interface should be used. If write activity averages under 18 Megabytes per hour, then a 56 kilobyte interface is sufficient. Because of the on-going expense, the lowest bandwidth to support the normal flow should be chosen. The following table will help in evaluating the communication link requirements.

Bandwidth vs. Performance
Bandwidth (Average Throughput)

T1 (1.54 Mb/s) [1] -- 360 MBytes/hr [2]

1/2T1 (.75 Mb/s) -- 180 MBytes/hr

1/4T1 (.37 Mb/s) -- 90 MBytes/hr

ISDN (128 Kb/s) -- 30 MBytes/hr

56 Kb/s -- 18 MBytes/hr

[1] Mb/s refers to megabits per second [2] MBytes/hr refers to megabytes per hour

The above numbers are for uncompressed data. Information isn't available at this time to indicate system performance with the optional compression circuitry installed.

The NVB in the local Off-SiteServer V.35 unit serves to absorb any burst activity (up to the size limit of approximately 850 Megabytes) seen on the network by storing the burst data until it can be transferred out. The system administrator can set up the local Off-SiteServer V.35 to more readily accommodate burst traffic by adjusting the priority handling ratios associated with the NVB. That is, when Off-SiteServer V.35 detects a high level of activity it can be directed to place a higher priority on reducing dirty cache than on transferring the data out to the remote server. Off-SiteServer V.35 will also detect the drop in activity, when the burst has diminished, and revert back to the normal mode of transfer.

Locked Mirroring
Once a pair of disk systems are completely mirrored there is no normal event that can "break" that mirror. However, if a drive has failed, or is disconnected, NetWare detects the problem and begins to maintain a disparity table. Should the drive come back on line, NetWare will only "remirror" those sectors which were not updated during the failure period, as given by its disparity table.

The coverage of the disparity table to the drive is limited by the amount of server cache available and the size of the drive. Depending upon these parameters, should a drive failure or disconnect occur, the server may eventually lose track of the mirrored differences. If this occurs, when the drive becomes reestablished, NetWare will force a complete

remirror.

Another advantage, therefore, to the NVB and SmartAck system on the Off-SiteServer V.35 is that temporary communication line failures will not result in a potential loss of mirror. This is because the local NetWare server will be unaware of any problem until the local NVB either becomes full or has reached a user-determined level.

Communication Interfaces
The original Off-SiteServer V.35 release incorporated an internal CSU/DSU and was limited to a T1 interface. The current version provides a common V.35 interface and allows connection to a number of communications channels, such as T1/E1, fractional T1/E1, 56 CBS, ISDN, etc. In addition, there is V.35 compatible equipment available which will interface to ATM, Ethernet, Token Ring, and FDDI.

System Requirements (System Check List)
A typical installation using Off-SiteServer V.35 requires the following elements:

- NConsole program data returned to MiraLink for analysis (see following section)
- One pair of Off-SiteServer V.35 units
- One pair of EISA Vinca StandbyServer 32 link cards
- One pair of V.35 CSU/DSU high speed modems, matched to interface with the dedicated line you have installed (56k, T1, etc.)
- A high speed line installed between primary and backup sites. The line speed is determined by the NConsole data analysis.
- One EISA off-site server to receive mirrored data from the EISA primary server. The disk drive capacity of both servers must be equal in size, and of similar configuration (i.e., Raid 5, etc.). Ideally, the off-site server should be equal in performance capability to the primary server, but this is not required.

Determining Communication Bandwidth Requirements
An analysis needs to be performed on a server to determine how much average traffic or activity takes place on the system. MiraLink provides a free software program from Avanti Corporation for companies wishing to run this analysis. This program, NConsole, comes with a free 30-day evaluation license. It is available from Avanti's web site. MiraLink suggests that a company run Nconsole for at least a week and then send the collected data to MiraLink for analysis. This can be done either by mailed disk or through our web FTP site. Please see MiraLink's web site (under server evaluation) for complete details.

Please note: MiraLink(and Off-SiteServer V.35(are trademarks of MiraLink Corporation. All other brand and product names mentioned herein are trademarks or registered trademarks of their respective holders.

The information found in this Technical Review is for conceptual analysis only. MiraLink believes that all descriptions, reports and statements contained herein are true, but makes no claims as to their definitive accuracy.

Retu

Data Sheet

Off-SiteServer V.35™

NetWare File Server Mirroring Over High Speed Communication Links

Off-SiteServer V.35 is the premier product for real-time mirroring of data to a file server at a remote site. It provides a cost effective solution for the client/server arena while yielding true wide area network fault tolerance.

Using standard disk mirroring under Novell's NetWare™, Off-SiteServerV.35™ mirrors all files down to the transaction to a remote site, via standard telecommunication lines or routable protocols. Once this mirror is implemented, the remote server is essentially a duplicate of the host NetWare™ server. All files, including open, closed, bindery, etc., are mirrored across a high speed communication link. In the event of a main server failure, the remote server can be started as a NetWare™ server with up-to-date file information in a matter of moments.

Data Communications LAN Times BEST OF SHOW 1995 LAS VEGAS

Integral to Off-SiteServer is the SmartAck™ (smart acknowledge) system, in combination with our non-volatile buffer, provides the key to minimizing dirty cache buffers and outstanding disk requests during periods of heavy activity. The SmartAck™ system also allows the selected communication channel to operate in the background, non-obtrusive to the host server.

Working in accord with our SmartAck™ system, MiraLink™ has an NLM that inhibits disk reads over the wide area network. This NLM, developed jointly with Novell, reduces traffic and helps improve network performance.

The V.35 output of the Off-SiteServer units provides a myriad of options with regards to a preferred communications channel interface. Through an external CSU/DSU or compatible bridge these units can interface to: ATM, T1/E1, Fractional T1/E1, ISDN, Frame Relay, Ethernet, FDDI, Token Ring, etc. Twist pair connections up to 5,000 ft. can also be supported.

Our second generation interface allows the network administrator to directly control many of the Off-SiteServerÍs functions through a user friendly menu based touchpad. These controls allow direct monitoring of performance as well as customized configuration.

The standard Offl-SiteServer V.35™ configuration consists of a pair of rack-mountable devices, interface cables, Vinca™ StandbyServer32™ link cards and software.

Provides a high level of fault-tolerance to the enterprise network.

Complements existing back-up strategies and "hot site" strategies.

Reduces reliance on back-up tape storage without requiring users to log off the network. Encourages disaster prevention and recovery efforts.

Utilizes SmartAck technology (hierarchical pre-acknowledge), to reduce dirty cache buffers and maintain LAN performance.

Maintains mirroring in the event of a temporary line disruption.

Provides diagnostic information via keypad and LCD display.

NLM utility inhibits disk reads to remote server to improve network performance.

Specifications

Total System Throughput
MAX (with T1 lines): up to 360Mbytes/hr
MIN (with 56Kbs): up to 18Mbytes/hr

Interfaces
Novell NetWare: ver 3.x and higher
User interface: V.35 DTE, Keypad, LCD, LED
Data interface: Via DB25 (EIA-530) Connector

Elcctrical
Operating voltages: 120/240VAC, 60/50Hz
Power consumption: 37W

Dimensions
2U rack-mount: 3.5 x 18 x 19 inch housing

Buffer
NonVolatile: 1.2 or 4.0 GB

Configuration Diagram

MiraLink Corporation
180 South 300 West Salt Lake City, UT 84101
Phone 1-801-575-LINK (5465)
Fax 1-801-532-LINK (5465)

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Alert! for Windows NT

As corporations become increasingly dependent on their network systems, network administrators need to be aware of changes as they occur within network devices. The Simple Network Management Protocol (SNMP) has become the de-facto standard for monitoring and making changes in network devices over the last several years. However, due to lag in vendor support, or excessive expense, many critical network components still do not yet support SNMP. *Alert!* for Windows NT addresses several areas of management within your NT server, assisting you to be more aware of the file server configuration and operation.

Alert! for Windows NT is a NT SNMP extension DLL that can be loaded on all of your NT servers or workstations. It will generate Standard SNMP v1 TRAPs to any SNMP management console to notify you of important NT OS and application events. The TRAPs represent information about Configuration, Performance, Security, and Accounting Management. Each TRAP is sent including the Network Integration Enterprise ID, a unique specific TRAP ID, and variable bindings that provide details about the event. *Alert!* for Windows NT includes the following features:

- SNMP extension DLL written in C++
- Supports NT 3.51 and NT 4.0 Server and Workstation
- Generates 100% Standard SNMP TRAPs
- Will Log TRAPs to a local log file
- Easy to customize and configure
- Each TRAP can be individually enabled/disabled

There are more than 500 TRAPs that are built into *Alert!* for Windows NT and all NT event messages can be remapped into standard SNMP TRAPs. Previously these event messages could only be seen if you viewed your NT event log. Now these messages can be sent to your SNMP management console for immediate notification. Conditions such as Services starting or stopping, Security changes, Hardware and Software problems—all messages that would appear in your event log—can now be reported and easily tracked.

Alert! for Windows NT comes configured to generate numerous TRAPs for key NT OS events including Configuration, Performance, Security and Accounting. Some of the areas supported are:

File Server Status
- Service Status (Start/Stop)
- Shares
- Print Jobs
- User Account changes
- File Server Time Changes
- File Server Shutdown
- Memory Events
- Packet Buffer Events

User and Connection Status
- Connection Status
- Login/Logout Status

• Intruder Detection
• Security Rights Changes
• Out of Connections
File System Status
• Volume Status
• Directory Structure Changes
• File System Rights Changes
All Event Log Messages
• Any Event Log message can be sent as a TRAP
• Application- or service-specific messages can be remapped as unique TRAPs

To Download an Evaluation Copy of *Alert!* for Windows NT:

1. Click on the link below to download the program to your computer. Save the program wherever you would like on your hard drive.

Server Version: Alertsv.exe (1,544KB)
Workstation Version: Alertws.exe (1,544KB)

2. Download the *Alert* Manual and follow the instructions for installing the program. *NOTE: The manual is in Adobe Acrobat format. If you do not have the **free** Adobe Acrobat Reader, you can download it directly from Adobe.*

alert.pdf (140KB)

3. Contact MiraLink for registration numbers:

Phone -- (801) 575-LINK (5465)
Fax -- (801) 532-LINK
E-mail -- rmccabe@miralink.com

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Uptime Monitor

Uptime Monitor functions as a network management console. Uptime Monitor provides a network administrator with a simple interface for monitoring the status of key network devices using SNMP. Uptime Monitor includes the following features:

- Configurable Polling Interval
- Display of Device Uptime
- Automatic Sorting of Devices by Name, Uptime, or Status
- Simple Alarm Window
- Alarm Indication for Device Timeouts or SNMP Alarms (TRAPs) Received
- Ability to Invoke Other SNMP Tools

Uptime Monitor initiates alarms when monitored network elements do not respond to polling. Designed for PCs operating with Windows 95 or Windows NT, Uptime Monitor is easily installed and does not require expensive, dedicated hardware, Uptime Monitor simply runs in the background environment of your PC.

To Download an Evaluation Copy of Uptime Monitor:

1. Click on the link below to download the program to your computer. Save the program wherever you would like on your hard drive.

Server Version: uptime.exe (2,115KB)

2. Download the Uptime Monitor Manual and follow the instructions for installing the program. *NOTE: The manual is in Adobe Acrobat format. If you do not have the free Adobe Acrobat Reader, you can download it directly from Adobe.*

uptime.pdf (121KB)

3. Contact MiraLink for registration numbers:

Phone -- (801) 575-LINK (5465)
Fax -- (801) 532-LINK
E-mail -- tmccabe@miralink.com

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How to Get More Information

Included Product Trial Offer

MiraLink has the only patented technology which, in a cost-effective and practical manner, enables disaster recovery of critical data at the network operating system level.

To receive more information directly from MiraLink or by mail:
Hours -- 9:00A.M. to 5:00P.M. Mountain Time Monday through Friday
180 South 300 West, Salt Lake City, Utah 84101
Phone -- (801) 575-LINK (5465)
Fax -- (801) 532-LINK
E-mail -- rmccabe@miralink.com

To receive more information by e-mail, please send the following information:

1. Name
2. Company Name
3. Address
4. Phone and Fax
5. E-Mail address
6. Questions/Comments

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Platinum VAR

Tabin Technology
1717 West Barry
New York. NY
10165-0516
(212) 949-2290

sales@tabin.com

VAR

Safetynet PLC
12-13 Bracknell
Beeches
Bracknell
Bershire RG12 7BW
England
01344 . 869933
01344 . 360474
(fax)
www.safetynet.co.uk

Applied PC Systems
West Springfield.
MA 01089
(413) 739-7390

Logical Computer Solutions
60 East 42nd Street,
Suite 408
New York, NY
10165-0516
(212) 949-2290

Starcom
Culla Ruthnam

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MIRALINK™ CORPORATION

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MiraLink is a worldwide supplier of hardware and software for the client/server market. MiraLink devices, when attached to both primary and standby file servers, enable real-time duplication (mirroring) of mission-critical data at remote locations.

NETSCAPE 2.0 ENHANCED

iCount.com

Support Information

Hours -- 9:00A.M. to 5:00P.M. Mountain Time Monday through Friday
180 South 300 West, Suite #130, Salt Lake City, Utah 84101
Phone -- (801) 575-5465
Fax -- (801) 532-5465
E-mail -- mlink@miralink.com

To receive support by e-mail, please send the following information: Name:

Company Name:

Company address:

Phone:
Fax:
E-Mail address:

Host system configuration:

Manufacturer/Model number:

Hard disk make/model number:

Hard disk partition size:

System memory:

Description of problem:

Remote system configuration:

Manufacturer/Model numbcr:

Hard disk make/model number:

Hard disk partition size:

System memory:

Description of problem:

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Company Backgrounder

CORPORATE INFORMATION

MiraLink Corporate Information

Founded in April, 1994, MiraLink is a worldwide supplier of hardware and software for the client/server market. MiraLink devices, when attached to both primary and standby file servers, enable real-time duplication (mirroring) of mission-critical data at remote locations. MiraLink units keep time-sensitive functions up and running regardless of natural or man-created threats.

Corporate Strategy:
MiraLink's strategy is to provide the premier business continuity/disaster recovery system for PC networks. The Company provides cost-efficient, easy-to-manage products, distinguished by quality and reliability, which maximize data security without denigrating network performance.

Corporate Headquarters:
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Salt Lake City, Utah 84101
Phone: 1 801 575-LINK (5465)
Fax: 1 801 532-LINK (5465)
mlink@miralink.com (Internet)

Press Contact: Ron McCabe
Vice President Market and Business Development
(801) 575-LINK (5465) ext 203

Financing:
MiraLink is a privately held company, backed by venture financing.

Please note: MiraLink (and Off-SiteServer) are trademarks of MiraLink Corporation. All other brand and product names mentioned herein are trademarks or registered trademarks of their respective holders.

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Market Category:
MiraLink and its products provides services in the business continuity/disaster recovery market -- specifically, in the remote back-up market.

Product:
MiraLink has the only patented technology which, in a cost-effective and practical manner, enables disaster recovery of critical data at the network operating system level.

For years, mainframe computer MIS managers have taken the availability of remote backup and security of

their companies data for granted. MiraLink products bring this functionality -- and resulting peace of mind -- to the PC LAN market by making real-time remote mirroring for Novell LANs possible.

The standard Off-SiteServer V.35 (configuration consists of a pair of rack-mountable devices, interface cables, Vinca StandbyServer 32 link cards, and software.

The foundation of the system is the disk mirroring function (SFTII) of Novell"s NetWare (versions 3.12 and 4.1 work best and are highly recommended). Physically, MiraLink products are a combination of software and hardware contained in a pair of Off-SiteServer V.35 units. Each of these is connected to a Vinca StandbyServer disk driver and link card, one in the company's main Novell NetWare server and the other, off-site, in the NetWare standby server. Vinca's product in the main server removes the mirrored disk from the host system and places it in a standby "warm" server, hence the same "StandbyServer."

MiraLink's Off-SiteServer V.35 unit adjacent to the host system essentially intercepts the Vinca link card information and prepares it for transmission across a low bandwidth communications channel. At the standby site, the remote Off-SiteServer V.35 receives and restores the data to its original format and then transfers it to the actual standby server. From the Novell and Vinca standpoints, the Off-SiteServer V.35 system become transparent. The only significant difference is that the MiraLink products enable the functionality to be accomplished at a remote location up to thousands of miles away.

Communications Interfaces:

The V.35 output of the Off-SiteServer units provides a number of options for a company's communications channel interface. Through an external CSU/DSU or router compatible bridge, these units can interface to: ATM, T1/E1, fractional T1/E1, ISDN, frame relay ethernet, FDDI, token ring, etc. Twisted pair connections up to 5,000 feet are also supported.

Product Benefits:

MiraLink's primary product benefits can be summarized as follows: 1) continuous mirroring to the last transaction prior to primary file server failure; 2) activation of the standby server within minutes of primary server failure or destruction; 3) accommodating multiple communication protocols; and 4) enabling the use of low-bandwidth links to reduce recurring communication costs.

In addition, MiraLink's system does not require network users to log off the network. It inhibits disk reads, thus reducing traffic and improving network performance. It minimizes dirty cache buffers/outstanding disk requests and maintains LAN performance. Finally, it has a user-friendly menu-based touchpad plus LCD and LED displays for diagnostic information and easy network administration/control.

Likely Purchasers:

Any business that runs on a Novell PC LAN and which has continuously-updated, mission-critical data is a logical prospect for MiraLink's Off-SiteServer system.

The need for PC LAN "electronic vaulting" (real-time data duplication) may stem from any one of -- or a combination of -- the following: a corporate policy regarding risk exposure; downsizing from mainframe computing; national disaster recovery regulation compliance; the threat of physical interruptions such as electric power disturbances or natural and weather-related disasters; or the possibility of acts of sabotage or vandalism.

MiraLink's products are most appropriate in situations where the cost to protect against the loss of electronic data, while not insignificant, is inconsequential in comparison to the cost to replace potentially lost data. Market segments where such a situation exists include -- but are not limited to -- the following:

- data recovery service providers
- banking/financial services
- trading
- insurance
- Federal agencies with regional offices
- airlines/car rental/travel
- telecommunications
- research laboratories

Distribution:

MiraLink currently sells its systems directly and through value added resellers (VARs) and systems integrators.

Sales Offices: Headquarters:

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E-mail -- pford@miralink.com
Vice-President Sales and Support

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European sales manager

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Product Information

PRODUCT

PRESS COMMENTS

TECHNICAL REVIEW

DATA SHEET

Supports T1/E1, Frac T1/E1, Ethernet, FDDI, ISDN, Frame Relay, etc.

Retrievable Data in Ready to Use Format.

Uses Low Bandwidth (low cost) Connection.

Compatible with Vinca® StandbyServer® and Snapshot® Products.

Reduces Reliance on Tape Backup Systems.

MiraLink Product

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Off-SiteServer V.35 Press Comments

Click here forpress comments on Off-SiteServer V.35.

Technical Review

Click here for a complete technical review of Off-SiteServer V.35.

Data Sheet

Click here for a data sheet of Off-SiteServer V.35.

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Press Comments

Off-SiteServer V. 35

NetWare File Server Mirroring Over High Speed Communication Links

"Having a mirrored NetWare server next to your main machine will be of enormous benefit should your main server fail. But it the building catches fire, or the roof collapses, both servers will be destroyed. If it's essential to get your company up and working immediately after a total disaster, you're going to have to create a complete office environment at a remote site. MiraLink's Off-SiteServer V.35 can help you do just that.

"Off-SiteServer is aimed at companies that can't afford to lose business due to fire, flood and other catastrophes. It's not cheap, but it it's the difference between going out of business and surviving, cost won't be an issue. "
Louise Lindop *PC Magazine UK July, 1996*

"Because MiraLink's Off-SiteServer buffers the data, such low-speed WAN links as 56k bps, ISDN or fractional T-1 lines may be used. Therefore, cheaper WAN connections can quickly pay back the cost of the expensive MiraLink hardware. Enterprises with infrequent but massive spikes of data mirroring, such as with database downloads, do not need high WAN bandwidth for Off-SiteServer.

"Just for kicks, we vandalized the WAN link (by pulling out a cable) to see what Off-SiteServer would do. It merely noted that the link was down and continued to buffer the data. We even swapped a 56K bps link for a T-1 in midstream, then back again, with no ill effects. We were impressed." **"Skirting Server Disaster" Ken Phillips** *PC Week June 17, 1996*

"Off-SiteServer provides NetWare installations with a unique way to distribute server tolerance across the wide area network, using anything from analog dial-up lines for near-real-time backup to T-1 links for actual server mirroring. By enabling centralized backup of multiple remote sites and protecting users from disasters at a particular location, Off-SiteServer makes the PC-LAN environment a more robust platform for business-critical applications."
Susan Breidenback *Editor in Chief LAN Times April, 1995*

"For network managers, ensuring server uptime is the chief challenge of their jobs: natural disasters, criminal acts, human error, parts failures and just plain bad luck can all bring a network to a crashing halt. For peace of mind and complete protection...the most thorough solution is to clone a vital server, either across the campus for local fault tolerance or off-site for full-blown disaster recovery.

"MiraLink Corp., maker of the WAN-based

Off-SiteServer V.35, solves the WAN bandwidth problem by first buffering all mirror requests to a large hard disk in MiraLink's box. Even if the WAN link fails, mirroring can still occur at top speed as a local disk mirror. The buffer also makes it possible to use low-speed WAN connections, down to 56k bps, thereby saving money on the corporate communications bill."
"For safety, nothing beats server cloning" *Ken Phillips PC Week June 17, 1996*

"If you could foresee a disaster coming to your customer's network, would you: a) make sure all the backups were done and bring a set of archive tapes off-site; b) install a standby server in a mirrored configuration; or c) install a standby server in a mirrored configuration at your own office and let it work remotely?

"If you think the third option sounds good, check out Off-SiteServer V.35, a solution developed by MiraLink in conjunction with Vinca and Novell. Off-SiteServer V.35 lets you build a mirrored file server environment using telecom channels or routable protocols. Building such an environment is not as tricky--or costly--as you might think."
"Stand By, Remotely" *Dave Brambert Network VAR January, 1996*

"MiraLink's Off-SiteServer works with Vinca's StandbyServer hardware and software to allow the remote server to be a distant site. That capability is 'particularly attractive for disaster-recovery purposes,' say Robert Janusaitis, a consultant with BSG Consulting in Houston. 'After the World Trade Center (bombing), a lot of people will want this capability,' adds Paul Mason, research mgr., system level software at International Data.
"NetWare: Higher Availability at Lower Cost" Paul Strauss *Datamation Nov. 15, 1994*

"Off-SiteServer includes software and two rack-mountable units. One unit remains at the host site and is connected to the second, a remote unit, via a dedicated T1 or E1 telephone line, making the system safe from any disaster that may befall the host area. 'Right now there are a lot of mainframe and minicomputer products that do what this does, but Off-SiteServer is relatively unique in a LAN environment,' said Jim Greene, an analyst with BIS Strategic Decisions, in Norwell, Mass."
"MiraLink Mirrors Servers for Real-time Access" Cate T. Corcoran *Info World September 19, 1994*

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Technical Review

MiraLink (Off-SiteServer V. 35)

NetWare File Server Mirroring Over High Speed Communication Links

OVERVIEW

Off-SiteServer V.35 is a sophisticated system designed to enable disk mirroring on a real-time basis, over standard communication lines. The two foundations of the system are: Novell NetWare, specifically the proven and reliable disk mirroring function (SFTII) therein; and Vinca's StandbyServer 32 product.

Vinca's StandbyServer 32 takes advantage of the numerous features and strengths of NetWare disk mirroring and has provided a value-added benefit to NetWare by removing the mirrored disk from the host system and placing it in a standby "warm" server; hence the name "StandbyServer." The standby server, at a minimum, must be capable of running NetWare and have at least the amount of disk space as will be mirrored to it from the primary server.

The StandbyServer 32 product consists of: a disk driver; pseudo disk controllers, or "link" cards, installed in both the primary and standby servers; and a file management system in the form of an NLM, loaded on the standby server. The primary server is set up as if it has two mirrored local partitions (NetWare restricts all mirroring to a partition level). In reality, one of those partitions is located in the standby server. The Vinca software/hardware combination on the primary server acts as a disk interface system. However, rather than porting the data directly to a local drive, it transfers it out through its internal link card and into the standby server link card. The NLM running on a limited version of NetWare on the standby server ensures that the disk write information is placed on its disk system.

When this setup has been implemented and the primary server fails, the standby server can become the active server, with completely up-to-date file information, in a matter of minutes. It accomplishes this by downing the limited NetWare system and then activating the duplicated "real server".

The connection between the link cards of the NetWare server and the standby server is made with a custom, high-speed interface cable. Though performance with this configuration is quite good, the distance limitation of 25 to 50 feet becomes a severe drawback to many potential clients. These clients recognize that a disaster that affects the primary server can all too easily also affect the back-up in the same location. Therefore, to avoid this, they view off-site disaster prevention and recovery as a prime requirement.

The Off-SiteServer V.35 Solution

The Off-SiteServer V.35 system essentially intercepts the Vinca link card information and prepares it for transmission

across any one of a number of standard communications channels. At the standby site, Off-SiteServer V.35 receives and restores the data to its original format, then transfers it to the actual standby server. From both the Novell and Vinca systems' standpoints, the Off-SiteServer V.35 system becomes transparent. From the clients perspective, however, the difference is substantial because the backup is no longer limited to a server located a few feet away from the primary server. Now, the two servers can be separated by hundreds or even thousands of miles.

The Off-SiteServer V.35

The Off-SiteServer V.35 units in the system are identical as far as hardware is concerned, allowing swapping of the local (primary) and remote (secondary) units, if necessary. Because of software differences between the two sites, a menu function allows the administrator to select either "Local" or "Remote." The system hardware consists of two 2U rack mount boxes. Each one incorporates: a keypad; 4-line LCD; a sophisticated multi-processing system; a V.35 interface a power supply; and a hard disk drive.

Local Off-SiteServer V.35

The local Off-SiteServer V.35 unit performs the vast majority of tasks between the two sites. The Vinca link data, which is intercepted in the form of four serial links transmitted in parallel, must be correlated and eventually converted into a single serial stream. This converted data is then immediately stored to an internal1.2 gigabite NVB (Non-Volatile Buffer). Following a write to the NVB, Off-SiteServer V.35 will acknowledge the successful receipt of the write packet to NetWare through the Vinca subsystem, allowing NetWare to clear the outstanding packet from its internal cache and transmit the next write packet. It then becomes the responsibility of the Off-SiteServer V.35 to ensure the delivery of all packets stored on its internal NVB.

Off-SiteServer V.35 incorporates a V.35 standard interface which accepts complete packets from the main processor section for transmission to a CSU/DSU (Channel Service Unit/Data Service Unit) or other V.35 compatible equipment. This router is located externally to the Off-SiteServer V.35 unit. Packet integrity between the two Off-SiteServer V.35 units is ensured through the use of a 32 bit CRC (Cyclic Redundancy Check). The CRC is generated at the local site and checked at the remote site. If a corrupt packet is detected at the remote site, the local Off-SiteServer V.35 will retransmit the information from its NVB.

Remote Off-SiteServer V.35

The remote Off-SiteServer V.35 unit receives the incoming disk data through its connected CSU/DSU device and prepares it for transmission to the standby server link card. Its primary tasks include: the conversion of a single serial link to the four link system used by Vinca; and notification to the local site that the data was successfully received. Except when processing read requests (see below), the NVB on the remote system usually remains inactive.

Read vs. Write

One of the normal benefits of NetWare mirroring is that

NetWare will use any or all of the mirrored drives when processing read requests. That is, when NetWare obtains a read request from a system user it will use the best available drive (as determined by its own algorithm) to process that request. When numerous read requests are presented, those read requests are typically split up among the mirrored drives. This is commonly referred to as NetWare's "split-seek" function.

Unfortunately, the split-seek feature becomes a severe hindrance to the mirrored drive system when one of the mirrored drives is located off-site. Read requests can take much longer to process, resulting in a potentially significant performance loss. To avoid this possibility, MiraLink provides an NLM (NOSPLTSK.NLM) which disables the split-seek capability of NetWare versions 3.12 and 4.1. Its use is highly recommended.

Even with the NLM loaded there will be occasional read requests given by the local server. In general, when this occurs, the remote Off-SiteServer V.35 unit must duplicate the actions normally only seen in the local unit. That is, it must store the read information to its NVB, attach a checksum, transmit the data through the CSU/DSU, etc. Herein lies the essence of the Off-SiteServer V.35 technology.

The difficulty arises when the requested data is still found on the local NVB. That is, when the requested data has not yet been transferred across the link to the standby server. Because of this possibility, a table of "sector references of data not yet transmitted" is kept on the local NVB. When a read request is received by the local Off-SiteServer V.35, the system first checks this table to see if the requested data may still be on the NVB. If this is the case, the data is simply read locally and no request is made to the standby server.

NVB and SmartAck

Users need to understand that when NetWare is presented with data to save to disk, it first places that data into its own cache memory (in the server). As soon as the disk drive system is available, the "saved" data is transferred out of cache and onto the disk drive system. Cache memory, used for the temporary data "holding tank", is considered "dirty" during the transition. Any data located in "dirty" cache is vulnerable to loss should a server failure occur.

NetWare maintains a very close synchronization between mirrored drives, allowing them to be out of sync only to the limit set in the "Concurrent Mirror Requests" parameter. Even with this set at its maximum limit (this depends upon the NetWare version and block size used), the disparity between mirrored drives will not exceed one or two megabytes. Typically, it will be much less than this. The net result is that the slowest drive in the system will determine the rate at which data is transferred out of dirty cache and into the disk drive system. Therefore, a slow drive increases the probability of increased dirty cache and, consequently, the probability of data loss should a system failure occur.

To combat such exposure, the NVB and SmartAck (Smart Acknowledgment) systems in the Off-SiteServer V.35 work in harmony to reduce dirty cache buffer buildup. The Off-SiteServer V.35 unit appears to NetWare to be a local disk system by storing and then immediately

acknowledging all write request packets.

Data In vs. Data Out
Generally speaking, the administrator will want to design this system so that the communications channel chosen will support the "normal" (average) flow of disk write information to be transmitted. That is, should the system experience disk write activity of 300 Megabytes per hour, a T1 interface should be used. If write activity averages under 18 Megabytes per hour, then a 56 kilobit interface is sufficient. Because of the on-going expense, the lowest bandwidth to support the normal flow should be chosen. The following table will help in evaluating the communication link requirements.

Bandwidth vs. Performance
Bandwidth (Average Throughput)

T1 (1.54 Mb/s) [1] -- 360 MBytes/hr [2]

1/2T1 (.75 Mb/s) -- 180 MBytes/hr

1/4T1 (.37 Mb/s) -- 90 MBytes/hr

ISDN (128 Kb/s) -- 30 MBytes/hr

56 Kb/s -- 18 MBytes/hr

[1] Mb/s refers to megabits per second [2] MBytes/hr refers to megabytes per hour

The above numbers are for un-compressed data. Information isn't available at this time to indicate system performance with the optional compression circuitry installed.

The NVB in the local Off-SiteServer V.35 unit serves to absorb any burst activity (up to the size limit of approximately 850 Megabytes) seen on the network by storing the burst data until it can be transferred out. The system administrator can set up the local Off-SiteServer V.35 to more readily accommodate burst traffic by adjusting the priority handling ratios associated with the NVB. That is, when Off-SiteServer V.35 detects a high level of activity it can be directed to place a higher priority on reducing dirty cache than on transferring the data out to the remote server. Off-SiteServer V.35 will also detect the drop in activity, when the burst has diminished, and revert back to the normal mode of transfer.

Locked Mirroring
Once a pair of disk systems are completely mirrored there is no normal event that can "break" that mirror. However, if a drive has failed, or is disconnected, NetWare detects the problem and begins to maintain a disparity table. Should the drive come back on line, NetWare will only "remirror" those sectors which were not updated during the failure period, as given by its disparity table.

The coverage of the disparity table to the drive is limited by the amount of server cache available and the size of the drive. Depending upon these parameters, should a drive failure or disconnect occur, the server may eventually lose track of the mirrored differences. If this occurs, when the

drive becomes re-established, NetWare will force a complete remirror.

Another advantage, therefore, to the NVB and SmartAck system on the Off-SiteServer V.35 is that temporary communication line failures will not result in a potential loss of mirror. This is because the local NetWare server will be unaware of any problem until the local NVB either becomes full or has reached a user-determined level.

Communication Interfaces
The original Off-SiteServer V.35 release incorporated an internal CSU/DSU and was limited to a T1 interface. The current version provides a common V.35 interface and allows connection to a number of communications channels, such as T1/E1, fractional T1/E1, 56 CBS, ISDN, etc. In addition, there is V.35 compatible equipment available which will interface to ATM, Ethernet, Token Ring, and FDDI.

System Requirements (System Check List)
A typical installation using Off-SiteServer V.35 requires the following elements:

- NConsole program data returned to MiraLink for analysis (see following section)
- One pair of Off-SiteServer V.35 units
- One pair of EISA Vinca StandbyServer 32 link cards
- One pair of V.35 CSU/DSU high speed modems, matched to interface with the dedicated line you have installed (56k, T1, etc.)
- A high speed line installed between primary and backup sites. The line speed is determined by the NConsole data analysis.
- One EISA off-site server to receive mirrored data from the EISA primary server. The disk drive capacity of both servers must be equal in size, and of similar configuration (i.e., Raid 5, etc.). Ideally, the off-site server should be equal in performance capability to the primary server, but this is not required.

Determining Communication Bandwidth Requirements
An analysis needs to be performed on a server to determine how much average traffic or activity takes place on the system. MiraLink provides a free software program from Avanti Corporation for companies wishing to run this analysis. This program, NConsole, comes with a free 30-day evaluation license. It is available from Avanti's web site.
MiraLink suggests that a company run Nconsole for at least a week and then send the collected data to MiraLink for analysis. This can be done either by mailed disk or through our web FTP site. Please see MiraLink's web site (under server evaluation) for complete details.

Please note: MiraLink(and Off-SiteServer V.35(are trademarks of MiraLink Corporation. All other brand and product names mentioned herein are trademarks or registered trademarks of their respective holders.

The information found in this Technical Review is for conceptual analysis only. MiraLink believes that all descriptions, reports and statements contained herein are true, but makes no claims as to

their definitive accuracy.

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Data Sheet

Off-SiteServer V.35™

NetWare File Server Mirroring Over High Speed Communication Links

Provides a high level of fault-tolerance to the enterprise network.

Complements existing back-up strategies and "hot site" strategies.

Reduces reliance on back-up tape storage without requiring users to log off the network. Encourages disaster prevention and recovery efforts.

Utilizes SmartAck technology (hierarchical pre-acknowledge), to reduce dirty cache buffers and maintain LAN performance.

Maintains mirroring in the event of a temporary line disruption.

Provides diagnostic information via keypad and LCD display.

NLM utility inhibits disk reads to remote server to improve network performance.

Off-SiteServer V.35 is the premier product for real-time mirroring of data to a file server at a remote site. It provides a

cost effective solution for the client/server arena while yielding true wide area network fault tolerance.

Using standard disk mirroring under Novell's NetWare™, Off-SiteServerV.35™ mirrors all files down to the transaction to a remote site, via standard telecommunication lines or routable protocols. Once this mirror is implemented, the remote server is essentially a duplicate of the host NetWare™ server. All files, including open, closed, bindery, etc., are mirrored across a high speed communication link. In the event of a main server failure, the remote server can be started as a NetWare™ server with up-to-date file information in a matter of moments.

Integral to Off-SiteServer is the SmartAck™ (smart acknowledge) system, in combination with our non-volatile buffer, provides the key to minimizing dirty cache buffers and outstanding disk requests during periods of heavy activity. The SmartAck™ system also allows the selected communication channel to operate in the background, non-obtrusive to the host server.

Working in accord with our SmartAck™ system, MiraLink™ has an NLM that inhibits disk reads over the wide area network. This NLM, developed jointly with Novell, reduces traffic and helps improve network performance.

The V.35 output of the Off-SiteServer units provides a myriad of options with regards to a preferred communications channel interface. Through an external CSU/DSU or compatible bridge these units can interface to: ATM, T1/E1, Fractional T1/E1, ISDN, Frame Relay, Ethernet, FDDI, Token Ring, etc. Twisted pair connections up to 5,000 ft. can also be supported.

Our second generation interface allows the network administrator to directly control many of the Off-SiteServer's functions through a user friendly menu based touchpad. These controls allow direct monitoring of performance as well as customized configuration.

The standard Off-SiteServer V.35™ configuration consists of a pair of rack-mountable devices, interface cables, Vinca™ StandbyServer32™ link cards and software.

Specifications

Total System Throughput
MAX (with T1 lines): up to 360Mbytes/hr
MIN (with 56Kbs): up to 18Mbytes/hr

Interfaces
Novell NetWare: ver 3.x and higher

User interface: V.35 DTE, Keypad, LCD, LED
Data interface: Via DB25 (EIA-530) Connector

Electrical
Operating voltages: 120/240VAC, 60/50Hz
Power consumption: 37W

Dimensions
2U rack-mount: 3.5 x 18 x 19 inch housing

Buffer
NonVolatile: 1.2 or 4.0 GB

Configuration Diagram

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Phone 1-801-575-LINK (5465) -- Fax 1-801-532-LINK (5465)

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How to Get More Information

Included Product Trial Offer

MiraLink has the only patented technology which, in a cost-effective and practical manner, enables disaster recovery of critical data at the network operating system level.

To receive more information directly from MiraLink or by mail:
Hours -- 9:00A.M. to 5:00P.M. Mountain Time Monday through Friday
180 South 300 West, Salt Lake City, Utah 84101
Phone -- (801) 575-LINK (5465)
Fax -- (801) 532-LINK
E-mail -- pford@miralink.com

To receive more information by e-mail, please send the following information:

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MIRALINK™ CORPORATION

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MiraLink is a worldwide supplier of hardware and software for the client/server market. MiraLink devices, when attached to both primary and standby file servers, enable real-time duplication (mirroring) of mission-critical data at remote locations.

NETSCAPE 2.0 ENHANCED

iCount.com

Support Information

Hours -- 9:00A.M. to 5:00P.M. Mountain Time Monday through Friday
180 South 300 West, Suite #130, Salt Lake City, Utah 84101
Phone -- (801) 575-5465
Fax -- (801) 532-5465
E-mail -- mlink@miralink.com

To receive support by e-mail, please send the following information: Name:

Company Name:

Company address:

Phone:
Fax:
E-Mail address:

Host system configuration:

Manufacturer/Model number:

Hard disk make/model number:

Hard disk partition size:

System memory:

Description of problem:

Remote system configuration:

Manufacturer/Model number:

Hard disk make/model number:

Hard disk partition size:

System memory:

Description of problem:

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Company Backgrounder

CORPORATE
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MiraLink Corporate Information

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Corporate Strategy:
MiraLink's strategy is to provide the premier business continuity/disaster recovery system for PC networks. The Company provides cost-efficient, easy-to-manage products, distinguished by quality and reliability, which maximize data security without denigrating network performance.

Corporate Headquarters:
180 South 300 West
Salt Lake City, Utah 84101
Phone: 1 801 575-LINK (5465)
Fax: 1 801 532-LINK (5465)
mlink@miralink.com (Internet)

Press Contact: Ron McCabe
Vice President Market and Business Development
(801) 575-LINK (5465) ext 203

Financing:
MiraLink is a privately held company, backed by venture financing.

Please note: MiraLink, and Off Site Servers are trademarks of MiraLink Corporation. All other brand and product names mentioned herein are trademarks or registered trademarks of their respective holders.

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Market Category:
MiraLink and its products provides services in the business continuity/disaster recovery market -- specifically, in the remote back-up market.

Product:
MiraLink has the only patented technology which, in a cost-effective and practical manner, enables disaster recovery of critical data at the network operating system level.

For years, mainframe computer MIS managers have taken the availability of remote backup and security of

their companies data for granted. MiraLink products bring this functionality -- and resulting peace of mind -- to the PC LAN market by making real-time remote mirroring for Novell LANs possible.

The standard Off-SiteServer V.35 (configuration consists of a pair of rack-mountable devices, interface cables, Vinca StandbyServer 32 link cards, and software.

The foundation of the system is the disk mirrorng function (SFTII) of Novell"s NetWare (versions 3.12 and 4.1 work best and are highly recommended). Physically, MiraLink products are a combination of software and hardware contained in a pair of Off-SiteServer V.35 units. Each of these is connected to a Vinca StandbyServer disk driver and link card, one in the company's main Novell NetWare server and the other, off-site, in the NetWare standby server. Vinca's product in the main server removes the mirrored disk from the host system and places it in a standby "warm" server, hence the same "StandbyServer."

MiraLink's Off-SiteServer V.35 unit adjacent to the host system essentially intercepts the Vinca link card information and prepares it for transmission across a low bandwidth communications channel. At the standby site, the remote Off-SiteServer V.35 receives and restores the data to its original format and then transfers it to the actual standby server. From the Novell and Vinca standpoints, the Off-SiteServer V.35 system become transparent. The only significant difference is that the MiraLink products enable the functionality to be accomplished at a remote location up to thousands of miles away.

Communications Interfaces:

The V.35 output of the Off-SiteServer units provides a number of options for a company's communications channel interface. Through an external CSU/DSU or router compatible bridge, these units can interface to: ATM, T1/E1, fractional T1/E1, ISDN, frame relay ethernet, FDDI, token ring, etc. Twisted pair connections up to 5,000 feet are also supported.

Product Benefits:

MiraLink's primary product benefits can be summarized as follows:)1 continuous mirroring to the last transaction prior to primary file server failure; 2) activation of the standby server within minutes of primary server failure or destruction; 3) accommodating multiple communication protocols; and 4) enabling the use of low-bandwidth links to reduce recurring communication costs.

In addition, MiraLink's system does not require network users to log off the network. It inhibits disk reads, thus reducing traffic and improving network performance. It minimizes dirty cache buffers/outstanding disk requests and maintains LAN performance. Finally, it has a user-friendly menu-based touchpad plus LCD and LED displays for diagnostic information and easy network administration/control.

Likely Purchasers:

Any business that runs on a Novell PC LAN and which has continuously-updated, mission-critical data is a logical prospect for MiraLink's Off-SiteServer system.

The need for PC LAN "electronic vaulting" (real-time data duplication) may stem from any one of -- or a combination of -- the following: a corporate policy regarding risk exposure; downsizing from mainframe computing; national disaster recovery regulation compliance; the threat of physical interruptions such as electric power disturbances or natural and weather-related disasters; or the possibility of acts of sabotage or vandalism.

MiraLink's products are most appropriate in situations where the cost to protect against the loss of electronic data, while not insignificant, is inconsequential in comparison to the cost to replace potentially lost data. Market segments where such a situation exists include -- but are not limited to -- the following:

- data recovery service providers
- banking/financial services
- trading
- insurance
- Federal agencies with regional offices
- airlines/car rental/travel
- telecommunications
- research laboratories

Distribution:

MiraLink currently sells its systems directly and through value added resellers (VARs) and systems integrators.

Sales Offices; Headquarters:

Pat Ford 1 801 575-LINK (5465)
E-mail -- pford@miralink.com
Vice-President Sales and Support

Europe:
Graham Pobjoy
011 44 1344-777006
E-mail -- gpobjoy@miralink.com
European sales manager

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Product Information

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Supports T1/E1, Frac T1/E1, Ethernet, FDDI, ISDN, Frame Relay, etc.

Retrievable Data in Ready to Use Format.

Uses Low Bandwidth (low cost) Connection

Compatible with Vinca® StandbyServer® and Snapshot® Products.

Reduces Reliance on Tape Backup Systems.

MiraLink Product

MiraLink has the only patented technology which, in a cost-effective and practical manner, enables disaster recovery of critical data at the network operating system level.

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Off-SiteServer V.35 Press Comments

Click here forpress comments on Off-SiteServer V.35.

Technical Review

Click here for a complete technical review of Off-SiteServer V.35.

Data Sheet

Click here for a data sheet of Off-SiteServer V.35.

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Press Comments

Off-SiteServer V. 35

NetWare File Server Mirroring Over High Speed Communication Links

"Having a mirrored NetWare server next to your main machine will be of enormous benefit should your main server fail. But it the building catches fire, or the roof collapses, both servers will be destroyed. If it's essential to get your company up and working immediately after a total disaster, you're going to have to create a complete office environment at a remote site. MiraLink's Off-SiteServer V.35 can help you do just that.

"Off-SiteServer is aimed at companies that can't afford to lose business due to fire, flood and other catastrophes. It's not cheap, but it it's the difference between going out of business and surviving, cost won't be an issue. "
Louise Lindop *PC Magazine UK July, 1996*

"Because MiraLink's Off-SiteServer buffers the data, such low-speed WAN links as 56k bps, ISDN or fractional T-1 lines may be used. Therefore, cheaper WAN connections can quickly pay back the cost of the expensive MiraLink hardware. Enterprises with infrequent but massive spikes of data mirroring, such as with database downloads, do not need high WAN bandwidth for Off-SiteServer.

"Just for kicks, we vandalized the WAN link (by pulling out a cable) to see what Off-SiteServer would do. It mcrely noted that the link was down and continued to buffer the data. We even swapped a 56K bps link for a T-1 in midstream, then back again, with no ill effects. We were impressed." **"Skirting Server Disaster" Ken Phillips** *PC Week June 17, 1996*

"Off-SiteServer provides NetWare installations with a unique way to distribute server tolerance across the wide area network, using anything from analog dial-up lines for near-real-time backup to T-1 links for actual server mirroring. By enabling centralized backup of multiple remote sites and protecting users from disasters at a particular location, Off-SiteServer makes the PC-LAN environment a more robust platform for business-critical applications."
Susan Breidenback *Editor in Chief LAN Times April, 1995*

"For network managers, ensuring server uptime is the chief challenge of their jobs: natural disasters, criminal acts, human error, parts failures and just plain bad luck can all bring a network to a crashing halt. For peace of mind and complete protection...the most thorough solution is to clone a vital server, either across the campus for local fault tolerance or off-site for full-blown disaster recovery.

"MiraLink Corp., maker of the WAN-based

Off-SiteServer V.35, solves the WAN bandwidth problem by first buffering all mirror requests to a large hard disk in MiraLink's box. Even if the WAN link fails, mirroring can still occur at top speed as a local disk mirror. The buffer also makes it possible to use low-speed WAN connections, down to 56k bps, thereby saving money on the corporate communications bill."
"For safety, nothing beats server cloning" *Ken Phillips PC Week June 17, 1996*

"If you could foresee a disaster coming to your customer's network, would you: a) make sure all the backups were done and bring a set of archive tapes off-site; b) install a standby server in a mirrored configuration; or c) install a standby server in a mirrored configuration at your own office and let it work remotely?

"If you think the third option sounds good, check out Off-SiteServer V.35, a solution developed by MiraLink in conjunction with Vinca and Novell. Off-SiteServer V.35 lets you build a mirrored file server environment using telecom channels or routable protocols. Building such an environment is not as tricky--or costly--as you might think."
"Stand By, Remotely" *Dave Brambert Network VAR January, 1996*

"MiraLink's Off-SiteServer works with Vinca's StandbyServer hardware and software to allow the remote server to be a distant site. That capability is 'particularly attractive for disaster-recovery purposes,' say Robert Janusaitis, a consultant with BSG Consulting in Houston. 'After the World Trade Center (bombing), a lot of people will want this capability,' adds Paul Mason, research mgr., system level software at International Data.
"NetWare: Higher Availability at Lower Cost" Paul Strauss *Datamation Nov. 15, 1994*

"Off-SiteServer includes software and two rack-mountable units. One unit remains at the host site and is connected to the second, a remote unit, via a dedicated T1 or E1 telephone line, making the system safe from any disaster that may befall the host area. 'Right now there are a lot of mainframe and minicomputer products that do what this does, but Off-SiteServer is relatively unique in a LAN environment,' said Jim Greene, an analyst with BIS Strategic Decisions, in Norwell, Mass."
"MiraLink Mirrors Servers for Real-time Access" Cate T. Corcoran *Info World September 19, 1994*

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Technical Review

MiraLink (Off-SiteServer V. 35)

NetWare File Server Mirroring Over High Speed Communication Links

OVERVIEW

Off-SiteServer V.35 is a sophisticated system designed to enable disk mirroring on a real-time basis, over standard communication lines. The two foundations of the system are: Novell NetWare, specifically the proven and reliable disk mirroring function (SFTII) therein; and Vinca's StandbyServer 32 product.

Vinca's StandbyServer 32 takes advantage of the numerous features and strengths of NetWare disk mirroring and has provided a value-added benefit to NetWare by removing the mirrored disk from the host system and placing it in a standby "warm" server; hence the name "StandbyServer." The standby server, at a minimum, must be capable of running NetWare and have at least the amount of disk space as will be mirrored to it from the primary server.

The StandbyServer 32 product consists of: a disk driver; pseudo disk controllers, or "link" cards, installed in both the primary and standby servers; and a file management system in the form of an NLM, loaded on the standby server. The primary server is set up as if it has two mirrored local partitions (NetWare restricts all mirroring to a partition level). In reality, one of those partitions is located in the standby server. The Vinca software/hardware combination on the primary server acts as a disk interface system. However, rather than porting the data directly to a local drive, it transfers it out through its internal link card and into the standby server link card. The NLM running on a limited version of NetWare on the standby server ensures that the disk write information is placed on its disk system.

When this setup has been implemented and the primary server fails, the standby server can become the active server, with completely up-to-date file information, in a matter of minutes. It accomplishes this by downing the limited NetWare system and then activating the duplicated "real server".

The connection between the link cards of the NetWare server and the standby server is made with a custom, high-speed interface cable. Though performance with this configuration is quite good, the distance limitation of 25 to 50 feet becomes a severe drawback to many potential clients. These clients recognize that a disaster that affects the primary server can all too easily also affect the back-up in the same location. Therefore, to avoid this, they view off-site disaster prevention and recovery as a prime requirement.

The Off-SiteServer V.35 Solution

The Off-SiteServer V.35 system essentially intercepts the Vinca link card information and prepares it for transmission

across any one of a number of standard communications channels. At the standby site, Off-SiteServer V.35 receives and restores the data to its original format, then transfers it to the actual standby server. From both the Novell and Vinca systems' standpoints, the Off-SiteServer V.35 system becomes transparent. From the clients perspective, however, the difference is substantial because the backup is no longer limited to a server located a few feet away from the primary server. Now, the two servers can be separated by hundreds or even thousands of miles.

The Off-SiteServer V.35

The Off-SiteServer V.35 units in the system are identical as far as hardware is concerned, allowing swapping of the local (primary) and remote (secondary) units, if necessary. Because of software differences between the two sites, a menu function allows the administrator to select either "Local" or "Remote." The system hardware consists of two 2U rack mount boxes. Each one incorporates: a keypad; 4-line LCD; a sophisticated multi-processing system; a V.35 interface a power supply; and a hard disk drive.

Local Off-SiteServer V.35

The local Off-SiteServer V.35 unit performs the vast majority of tasks between the two sites. The Vinca link data, which is intercepted in the form of four serial links transmitted in parallel, must be correlated and eventually converted into a single serial stream. This converted data is then immediately stored to an internal1.2 gigabite NVB (Non-Volatile Buffer). Following a write to the NVB, Off-SiteServer V.35 will acknowledge the successful receipt of the write packet to NetWare through the Vinca subsystem, allowing NetWare to clear the outstanding packet from its internal cache and transmit the next write packet. It then becomes the responsibility of the Off-SiteServer V.35 to ensure the delivery of all packets stored on its internal NVB.

Off-SiteServer V.35 incorporates a V.35 standard interface which accepts complete packets from the main processor section for transmission to a CSU/DSU (Channel Service Unit/Data Service Unit) or other V.35 compatible equipment. This router is located externally to the Off-SiteServer V.35 unit. Packet integrity between the two Off-SiteServer V.35 units is ensured through the use of a 32 bit CRC (Cyclic Redundancy Check). The CRC is generated at the local site and checked at the remote site. If a corrupt packet is detected at the remote site, the local Off-SiteServer V.35 will retransmit the information from its NVB.

Remote Off-SiteServer V.35

The remote Off-SiteServer V.35 unit receives the incoming disk data through its connected CSU/DSU device and prepares it for transmission to the standby server link card. Its primary tasks include: the conversion of a single serial link to the four link system used by Vinca; and notification to the local site that the data was successfully received. Except when processing read requests (see below), the NVB on the remote system usually remains inactive.

Read vs. Write

One of the normal benefits of NetWare mirroring is that

NetWare will use any or all of the mirrored drives when processing read requests. That is, when NetWare obtains a read request from a system user it will use the best available drive (as determined by its own algorithm) to process that request. When numerous read requests are presented, those read requests are typically split up among the mirrored drives. This is commonly referred to as NetWare's "split-seek" function.

Unfortunately, the split-seek feature becomes a severe hindrance to the mirrored drive system when one of the mirrored drives is located off-site. Read requests can take much longer to process, resulting in a potentially significant performance loss. To avoid this possibility, MiraLink provides an NLM (NOSPLTSK.NLM) which disables the split-seek capability of NetWare versions 3.12 and 4.1. Its use is highly recommended.

Even with the NLM loaded there will be occasional read requests given by the local server. In general, when this occurs, the remote Off-SiteServer V.35 unit must duplicate the actions normally only seen in the local unit. That is, it must store the read information to its NVB, attach a checksum, transmit the data through the CSU/DSU, etc. Herein lies the essence of the Off-SiteServer V.35 technology.

The difficulty arises when the requested data is still found on the local NVB. That is, when the requested data has not yet been transferred across the link to the standby server. Because of this possibility, a table of "sector references of data not yet transmitted" is kept on the local NVB. When a read request is received by the local Off-SiteServer V.35, the system first checks this table to see if the requested data may still be on the NVB. If this is the case, the data is simply read locally and no request is made to the standby server.

NVB and SmartAck

Users need to understand that when NetWare is presented with data to save to disk, it first places that data into its own cache memory (in the server). As soon as the disk drive system is available, the "saved" data is transferred out of cache and onto the disk drive system. Cache memory, used for the temporary data "holding tank", is considered "dirty" during the transition. Any data located in "dirty" cache is vulnerable to loss should a server failure occur.

NetWare maintains a very close synchronization between mirrored drives, allowing them to be out of sync only to the limit set in the "Concurrent Mirror Requests" parameter. Even with this set at its maximum limit (this depends upon the NetWare version and block size used), the disparity between mirrored drives will not exceed one or two megabytes. Typically, it will be much less than this. The net result is that the slowest drive in the system will determine the rate at which data is transferred out of dirty cache and into the disk drive system. Therefore, a slow drive increases the probability of increased dirty cache and, consequently, the probability of data loss should a system failure occur.

To combat such exposure, the NVB and SmartAck (Smart Aeknowledgment) systems in the Off-SiteServer V.35 work in harmony to reduce dirty cache buffer buildup. The Off-SiteServer V.35 unit appears to NetWare to be a local disk system by storing and then immediately

acknowledging all write request packets.

Data In vs. Data Out
Generally speaking, the administrator will want to design this system so that the communications channel chosen will support the "normal" (average) flow of disk write information to be transmitted. That is, should the system experience disk write activity of 300 Megabytes per hour, a T1 interface should be used. If write activity averages under 18 Megabytes per hour, then a 56 kilobit interface is sufficient. Because of the on-going expense, the lowest bandwidth to support the normal flow should be chosen. The following table will help in evaluating the communication link requirements.

Bandwidth vs. Performance
Bandwidth (Average Throughput)

T1 (1.54 Mb/s) [1] -- 360 MBytes/hr [2]

1/2T1 (.75 Mb/s) -- 180 MBytes/hr

1/4T1 (.37 Mb/s) -- 90 MBytes/hr

ISDN (128 Kb/s) -- 30 MBytes/hr

56 Kb/s -- 18 MBytes/hr

[1] Mb/s refers to megabits per second [2] MBytes/hr refers to megabytes per hour

The above numbers are for un-compressed data. Information isn't available at this time to indicate system performance with the optional compression circuitry installed.

The NVB in the local Off-SiteServer V.35 unit serves to absorb any burst activity (up to the size limit of approximately 850 Megabytes) seen on the network by storing the burst data until it can be transferred out. The system administrator can set up the local Off-SiteServer V.35 to more readily accommodate burst traffic by adjusting the priority handling ratios associated with the NVB. That is, when Off-SiteServer V.35 detects a high level of activity it can be directed to place a higher priority on reducing dirty cache than on transferring the data out to the remote server. Off-SiteServer V.35 will also detect the drop in activity, when the burst has diminished, and revert back to the normal mode of transfer.

Locked Mirroring
Once a pair of disk systems are completely mirrored there is no normal event that can "break" that mirror. However, if a drive has failed, or is disconnected, NetWare detects the problem and begins to maintain a disparity table. Should the drive come back on line, NetWare will only "remirror" those sectors which were not updated during the failure period, as given by its disparity table.

The coverage of the disparity table to the drive is limited by the amount of server cache available and the size of the drive. Depending upon these parameters, should a drive failure or disconnect occur, the server may eventually lose track of the mirrored differences. If this occurs, when the

drive becomes re-established, NetWare will force a complete remirror.

Another advantage, therefore, to the NVB and SmartAck system on the Off-SiteServer V.35 is that temporary communication line failures will not result in a potential loss of mirror. This is because the local NetWare server will be unaware of any problem until the local NVB either becomes full or has reached a user-determined level.

Communication Interfaces
The original Off-SiteServer V.35 release incorporated an internal CSU/DSU and was limited to a T1 interface. The current version provides a common V.35 interface and allows connection to a number of communications channels, such as T1/E1, fractional T1/E1, 56 CBS, ISDN, etc. In addition, there is V.35 compatible equipment available which will interface to ATM, Ethernet, Token Ring, and FDDI.

System Requirements (System Check List)
A typical installation using Off-SiteServer V.35 requires the following elements:

- NConsole program data returned to MiraLink for analysis (see following section)
- One pair of Off-SiteServer V.35 units
- One pair of EISA Vinca StandbyServer 32 link cards
- One pair of V.35 CSU/DSU high speed modems, matched to interface with the dedicated line you have installed (56k, T1, etc.)
- A high speed line installed between primary and backup sites. The line speed is determined by the NConsole data analysis.
- One EISA off-site server to receive mirrored data from the EISA primary server. The disk drive capacity of both servers must be equal in size, and of similar configuration (i.e., Raid 5, etc.). Ideally, the off-site server should be equal in performance capability to the primary server, but this is not required.

Determining Communication Bandwidth Requirements
An analysis needs to be performed on a server to determine how much average traffic or activity takes place on the system. MiraLink provides a free software program from Avanti Corporation for companies wishing to run this analysis. This program, NConsole, comes with a free 30-day evaluation license. It is available from Avanti's web site.
MiraLink suggests that a company run Nconsole for at least a week and then send the collected data to MiraLink for analysis. This can be done either by mailed disk or through our web FTP site. Please see MiraLink's web site (under server evaluation) for complete details.

Please note: MiraLink(and Off-SiteServer V.35(are trademarks of MiraLink Corporation. All other brand and product names mentioned herein are trademarks or registered trademarks of their respective holders.

The information found in this Technical Review is for conceptual analysis only. MiraLink believes that all descriptions, reports and statements contained herein are true, but makes no claims as to

their definitive accuracy.

Retu

Data Sheet

Off-SiteServer V.35™

NetWare File Server Mirroring Over High Speed Communication Links

Off-SiteServer V.35 is the premier product for real-time mirroring of data to a file server at a remote site. It provides a cost effective solution for the client/server arena while yielding true wide area network fault tolerance.

Provides a high level of fault-tolerance to the enterprise network.

Complements existing back-up strategies and "hot site" strategies.

Reduces reliance on back-up tape storage without requiring users to log off the network. Encourages disaster prevention and recovery efforts.

Utilizes SmartAck technology (hierarchical pre-acknowledge). to reduce dirty cache buffers and maintain LAN performance.

Maintains mirroring in the event of a temporary line disruption.

Provides diagnostic information via keypad and LCD display.

NLM utility inhibits disk reads to remote server to improve network performance.

Using standard disk mirroring under Novell's NetWare™, Off-SiteServerV.35™ mirrors all files down to the transaction to a remote site, via standard telecommunication lines or routable protocols. Once this mirror is implemented, the remote server is essentially a duplicate of the host NetWare™ server. All files, including open, closed, bindery, etc., are mirrored across a high speed communication link. In the event of a main server failure, the remote server can be started as a NetWare™ server with up-to-date file information in a matter of moments.

Data Communications LAN Times BEST OF SHOW 1995 LAS VEGAS

Integral to Off-SiteServer is the SmartAck™ (smart acknowledge) system, in combination with our non-volatile buffer, provides the key to minimizing dirty cache buffers and outstanding disk requests during periods of heavy activity. The SmartAck™ system also allows the selected communication channel to operate in the background, non-obtrusive to the host server.

Working in accord with our SmartAck™ system, MiraLink™ has an NLM that inhibits disk reads over the wide area network. This NLM, developed jointly with Novell, reduces traffic and helps improve network performance.

The V.35 output of the Off-SiteServer units provides a myriad of options with regards to a preferred communications channel interface. Through an external CSU/DSU or compatible bridge these units can interface to: ATM, T1/E1, Fractional T1/E1, ISDN, Frame Relay, Ethernet, FDDI, Token Ring, etc. Twisted pair connections up to 5,000 ft. can also be

supported.

Our second generation interface allows the network administrator to directly control many of the Off-SiteServer's functions through a user friendly menu based touchpad. These controls allow direct monitoring of performance as well as customized configuration.

The standard Off-SiteServer V.35TM configuration consists of a pair of rack-mountable devices, interface cables, VincaTM StandbyServer32TM link cards and software.

Specifications

Total System Throughput
MAX (with T1 lines): up to 360Mbytes/hr
MIN (with 56Kbs): up to 18Mbytes/hr

Interfaces
Novell NetWare: ver 3.x and higher
User interface: V.35 DTE, Keypad, LCD, LED
Data interface: Via DB25 (EIA-530) Connector

Electrical
Operating voltages: 120/240VAC, 60/50Hz
Power consumption: 37W

Dimensions
2U rack-mount: 3.5 x 18 x 19 inch housing

Buffer
NonVolatile: 850MB

Configuration Diagram

MiraLink Corporation 1997; 180 South 300 West Salt Lake City, UT 84101
Phone 1-801-575-LINK (5465) -- Fax 1-801-532-LINK (5465)

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MiraLink has the only patented technology which, in a cost-effective and practical manner, enables disaster recovery of critical data at the network operating system level.

To receive more information directly from MiraLink or by mail:
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180 South 300 West, Salt Lake City, Utah 84101
Phone -- (801) 575-LINK (5465)
Fax -- (801) 532-LINK
E-mail -- pford@miralink.com

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MIRALINK™ CORPORATION

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MiraLink is a worldwide supplier of hardware and software for the client/server market. MiraLink devices, when attached to both primary and standby file servers, enable real-time duplication (mirroring) of mission-critical data at remote locations.

NETSCAPE 2.0 ENHANCED

Company Backgrounder

CORPORATE INFORMATION

MiraLink Corporate Information

Founded in April, 1994, MiraLink is a worldwide supplier of hardware and software for the client/server market. MiraLink devices, when attached to both primary and standby file servers, enable real-time duplication (mirroring) of mission-critical data at remote locations. MiraLink units keep time-sensitive functions up and running regardless of natural or man-created threats.

Corporate Strategy:
MiraLink's strategy is to provide the premier business continuity/disaster recovery system for PC networks. The Company provides cost-efficient, easy-to-manage products, distinguished by quality and reliability, which maximize data security without denigrating network performance.

Corporate Headquarters:
180 South 300 West
Salt Lake City, Utah 84101
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mlink@miralink.com (Internet)

Press Contact: Ron McCabe
Vice President Market and Business Development
(801) 575-LINK (5465) ext 203

Financing:
MiraLink is a privately held company, backed by venture financing.

Please note: MiraLink (and Off Site Server) are trademarks of MiraLink Corporation. All other brand and product names mentioned herein are trademarks or registered trademarks of their respective holders.

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Market Category:
MiraLink and its products provides services in the business continuity/disaster recovery market -- specifically, in the remote back-up market.

Product:
MiraLink has the only patented technology which, in a cost-effective and practical manner, enables disaster recovery of critical data at the network operating system level.
For years, mainframe computer MIS managers have taken the availability of remote backup and security of

their companies data for granted. MiraLink products bring this functionality -- and resulting peace of mind -- to the PC LAN market by making real-time remote mirroring for Novell LANs possible.

The standard Off-SiteServer V.35 (configuration consists of a pair of rack-mountable devices, interface cables, Vinca StandbyServer 32 link cards, and software.

The foundation of the system is the disk mirroring function (SFTII) of Novell"s NetWare (versions 3.12 and 4.1 work best and are highly recommended). Physically, MiraLink products are a combination of software and hardware contained in a pair of Off-SiteServer V.35 units. Each of these is connected to a Vinca StandbyServer disk driver and link card, one in the company's main Novell NetWare server and the other, off-site, in the NetWare standby server. Vinca's product in the main server removes the mirrored disk from the host system and places it in a standby "warm" server, hence the same "StandbyServer."

MiraLink's Off-SiteServer V.35 unit adjacent to the host system essentially intercepts the Vinca link card information and prepares it for transmission across a low bandwidth communications channel. At the standby site, the remote Off-SiteServer V.35 receives and restores the data to its original format and then transfers it to the actual standby server. From the Novell and Vinca standpoints, the Off-SiteServer V.35 system become transparent. The only significant difference is that the MiraLink products enable the functionality to be accomplished at a remote location up to thousands of miles away.

Communications Interfaces:

The V.35 output of the Off-SiteServer units provides a number of options for a company's communications channel interface. Through an external CSU/DSU or router compatible bridge, these units can interface to: ATM, T1/E1, fractional T1/E1, ISDN, frame relay ethernet, FDDI, token ring, etc. Twisted pair connections up to 5,000 feet are also supported.

Product Benefits:

MiraLink's primary product benefits can be summarized as follows: 1) continuous mirroring to the last transaction prior to primary file server failure; 2) activation of the standby server within minutes of primary server failure or destruction; 3) accommodating multiple communication protocols; and 4) enabling the use of low-bandwidth links to reduce recurring communication costs.

In addition, MiraLink's system does not require network users to log off the network. It inhibits disk reads, thus reducing traffic and improving network performance. It minimizes dirty cache buffers/outstanding disk requests and maintains LAN performance. Finally, it has a user-friendly menu-based touchpad plus LCD and LED displays for diagnostic information and easy network administration/control.

Likely Purchasers:

Any business that runs on a Novell PC LAN and which has continuously-updated, mission-critical data is a logical prospect for MiraLink's Off-SiteServer system.

☐The need for PC LAN "electronic vaulting" (real-time data duplication) may stem from any one of -- or a combination of -- the following: a corporate policy regarding risk exposure; downsizing from mainframe computing; national disaster recovery regulation compliance; the threat of physical interruptions such as electric power disturbances or natural and weather-related disasters; or the possibility of acts of sabotage or vandalism.

☐MiraLink's products are most appropriate in situations where the cost to protect against the loss of electronic data, while not insignificant, is inconsequential in comparison to the cost to replace potentially lost data. Market segments where such a situation exists include -- but are not limited to -- the following:

- data recovery service providers
- banking/financial services
- trading
- insurance
- Federal agencies with regional offices
- airlines/car rental/travel
- telecommunications
- research laboratories

Distribution:

☐MiraLink currently sells its systems directly and through value added resellers (VARs) and systems integrators.

Sales Offices; Headquarters:

Pat Ford 1 801 575-LINK (5465)
E-mail -- pford@miralink.com
Vice-President Sales and Support

Europe:
Graham Pobjoy
011 44 1344-777006
E-mail -- gpobjoy@miralink.com
European sales manager

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Supports T1/E1. Frac T1/E1, Ethernet. FDDI. ISDN. Frame Relay, etc.

Retrievable Data in Ready to Use Format.

Uses Low Bandwidth (low cost) Connection.

Compatible with Vinca® StandbyServer® and Snapshot® Products.

Reduces Reliance on Tape Backup Systems.

MiraLink Product

MiraLink has the only patented technology which, in a cost-effective and practical manner, enables disaster recovery of critical data at the network operating system level.

For years, mainframe computer MIS managers have taken the availability of remote backup and security of their companies' data for granted. MiraLink products bring this functionality -- and resulting peace of mind -- to the PC LAN market by making real-time remote mirroring for Novell LANs possible.

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Off-SiteServer V.35 Press Comments

Click here forpress comments on Off-SiteServer V.35.

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Technical Review

MiraLink (Off-SiteServer V. 35)

NetWare File Server Mirroring Over High Speed Communication Links

OVERVIEW

Off-SiteServer V.35 is a sophisticated system designed to enable disk mirroring on a real-time basis, over standard communication lines. The two foundations of the system are: Novell NetWare, specifically the proven and reliable disk mirroring function (SFTII) therein; and Vinca's StandbyServer 32 product.

Vinca's StandbyServer 32 takes advantage of the numerous features and strengths of NetWare disk mirroring and has provided a value-added benefit to NetWare by removing the mirrored disk from the host system and placing it in a standby "warm" server; hence the name "StandbyServer." The standby server, at a minimum, must be capable of running NetWare and have at least the amount of disk space as will be mirrored to it from the primary server.

The StandbyServer 32 product consists of: a disk driver; pseudo disk controllers, or "link" cards, installed in both the primary and standby servers; and a file management system in the form of an NLM, loaded on the standby server. The primary server is set up as if it has two mirrored local partitions (NetWare restricts all mirroring to a partition level). In reality, one of those partitions is located in the standby server. The Vinca software/hardware combination on the primary server acts as a disk interface system. However, rather than porting the data directly to a local drive, it transfers it out through its internal link card and into the standby server link card. The NLM running on a limited version of NetWare on the standby server ensures that the disk write information is placed on its disk system.

When this setup has been implemented and the primary server fails, the standby server can become the active server, with completely up-to-date file information, in a matter of minutes. It accomplishes this by downing the limited NetWare system and then activating the duplicated "real server".

The connection between the link cards of the NetWare server and the standby server is made with a custom, high-speed interface cable. Though performance with this configuration is quite good, the distance limitation of 25 to 50 feet becomes a severe drawback to many potential clients. These clients recognize that a disaster that affects the primary server can all too easily also affect the back-up in the same location. Therefore, to avoid this, they view off-site disaster prevention and recovery as a prime requirement.

The Off-SiteServer V.35 Solution

The Off-SiteServer V.35 system essentially intercepts the Vinca link card information and prepares it for transmission

across any one of a number of standard communications channels. At the standby site, Off-SiteServer V.35 receives and restores the data to its original format, then transfers it to the actual standby server. From both the Novell and Vinca systems' standpoints, the Off-SiteServer V.35 system becomes transparent. From the clients perspective, however, the difference is substantial because the backup is no longer limited to a server located a few feet away from the primary server. Now, the two servers can be separated by hundreds or even thousands of miles.

The Off-SiteServer V.35

The Off-SiteServer V.35 units in the system are identical as far as hardware is concerned, allowing swapping of the local (primary) and remote (secondary) units, if necessary. Because of software differences between the two sites, a menu function allows the administrator to select either "Local" or "Remote." The system hardware consists of two 2U rack mount boxes. Each one incorporates: a keypad; 4-line LCD; a sophisticated multi-processing system; a V.35 interface a power supply; and a hard disk drive.

Local Off-SiteServer V.35

The local Off-SiteServer V.35 unit performs the vast majority of tasks between the two sites. The Vinca link data, which is intercepted in the form of four serial links transmitted in parallel, must be correlated and eventually converted into a single serial stream. This converted data is then immediately stored to an internal1.2 gigabite NVB (Non-Volatile Buffer). Following a write to the NVB, Off-SiteServer V.35 will acknowledge the successful receipt of the write packet to NetWare through the Vinca subsystem, allowing NetWare to clear the outstanding packet from its internal cache and transmit the next write packet. It then becomes the responsibility of the Off-SiteServer V.35 to ensure the delivery of all packets stored on its internal NVB.

Off-SiteServer V.35 incorporates a V.35 standard interface which accepts complete packets from the main processor section for transmission to a CSU/DSU (Channel Service Unit/Data Service Unit) or other V.35 compatible equipment. This router is located externally to the Off-SiteServer V.35 unit. Packet integrity between the two Off-SiteServer V.35 units is ensured through the use of a 32 bit CRC (Cyclic Redundancy Check). The CRC is generated at the local site and checked at the remote site. If a corrupt packet is detected at the remote site, the local Off-SiteServer V.35 will retransmit the information from its NVB.

Remote Off-SiteServer V.35

The remote Off-SiteServer V.35 unit receives the incoming disk data through its connected CSU/DSU device and prepares it for transmission to the standby server link card. Its primary tasks include: the conversion of a single serial link to the four link system used by Vinca; and notification to the local site that the data was successfully received. Except when processing read requests (see below), the NVB on the remote system usually remains inactive.

Read vs. Write

One of the normal benefits of NetWare mirroring is that

NetWare will use any or all of the mirrored drives when processing read requests. That is, when NetWare obtains a read request from a system user it will use the best available drive (as determined by its own algorithm) to process that request. When numerous read requests are presented, those read requests are typically split up among the mirrored drives. This is commonly referred to as NetWare's "split-seek" function.

Unfortunately, the split-seek feature becomes a severe hindrance to the mirrored drive system when one of the mirrored drives is located off-site. Read requests can take much longer to process, resulting in a potentially significant performance loss. To avoid this possibility, MiraLink provides an NLM (NOSPLTSK.NLM) which disables the split-seek capability of NetWare versions 3.12 and 4.1. Its use is highly recommended.

Even with the NLM loaded there will be occasional read requests given by the local server. In general, when this occurs, the remote Off-SiteServer V.35 unit must duplicate the actions normally only seen in the local unit. That is, it must store the read information to its NVB, attach a checksum, transmit the data through the CSU/DSU, etc. Herein lies the essence of the Off-SiteServer V.35 technology.

The difficulty arises when the requested data is still found on the local NVB. That is, when the requested data has not yet been transferred across the link to the standby server. Because of this possibility, a table of "sector references of data not yet transmitted" is kept on the local NVB. When a read request is received by the local Off-SiteServer V.35, the system first checks this table to see if the requested data may still be on the NVB. If this is the case, the data is simply read locally and no request is made to the standby server.

NVB and SmartAck

Users need to understand that when NetWare is presented with data to save to disk, it first places that data into its own cache memory (in the server). As soon as the disk drive system is available, the "saved" data is transferred out of cache and onto the disk drive system. Cache memory, used for the temporary data "holding tank", is considered "dirty" during the transition. Any data located in "dirty" cache is vulnerable to loss should a server failure occur.

NetWare maintains a very close synchronization between mirrored drives, allowing them to be out of sync only to the limit set in the "Concurrent Mirror Requests" parameter. Even with this set at its maximum limit (this depends upon the NetWare version and block size used), the disparity between mirrored drives will not exceed one or two megabytes. Typically, it will be much less than this. The net result is that the slowest drive in the system will determine the rate at which data is transferred out of dirty cache and into the disk drive system. Therefore, a slow drive increases the probability of increased dirty cache and, consequently, the probability of data loss should a system failure occur.

To combat such exposure, the NVB and SmartAck (Smart Acknowledgment) systems in the Off-SiteServer V.35 work in harmony to reduce dirty cache buffer buildup. The Off-SiteServer V.35 unit appears to NetWare to be a local disk system by storing and then immediately

acknowledging all write request packets.

Data In vs. Data Out
Generally speaking, the administrator will want to design this system so that the communications channel chosen will support the "normal" (average) flow of disk write information to be transmitted. That is, should the system experience disk write activity of 300 Megabytes per hour, a T1 interface should be used. If write activity averages under 18 Megabytes per hour, then a 56 kilobit interface is sufficient. Because of the on-going expense, the lowest bandwidth to support the normal flow should be chosen. The following table will help in evaluating the communication link requirements.

Bandwidth vs. Performance
Bandwidth (Average Throughput)

T1 (1.54 Mb/s) [1] -- 360 MBytes/hr [2]

1/2T1 (.75 Mb/s) -- 180 MBytes/hr

1/4T1 (.37 Mb/s) -- 90 MBytes/hr

ISDN (128 Kb/s) -- 30 MBytes/hr

56 Kb/s -- 18 MBytes/hr

[1] Mb/s refers to megabits per second [2] MBytes/hr refers to megabytes per hour

The above numbers are for un-compressed data. Information isn't available at this time to indicate system performance with the optional compression circuitry installed.

The NVB in the local Off-SiteServer V.35 unit serves to absorb any burst activity (up to the size limit of approximately 850 Megabytes) seen on the network by storing the burst data until it can be transferred out. The system administrator can set up the local Off-SiteServer V.35 to more readily accommodate burst traffic by adjusting the priority handling ratios associated with the NVB. That is, when Off-SiteServer V.35 detects a high level of activity it can be directed to place a higher priority on reducing dirty cache than on transferring the data out to the remote server. Off-SiteServer V.35 will also detect the drop in activity, when the burst has diminished, and revert back to the normal mode of transfer.

Locked Mirroring
Once a pair of disk systems are completely mirrored there is no normal event that can "break" that mirror. However, if a drive has failed, or is disconnected, NetWare detects the problem and begins to maintain a disparity table. Should the drive come back on line, NetWare will only "remirror" those sectors which were not updated during the failure period, as given by its disparity table.

The coverage of the disparity table to the drive is limited by the amount of server cache available and the size of the drive. Depending upon these parameters, should a drive failure or disconnect occur, the server may eventually lose track of the mirrored differences. If this occurs, when the

drive becomes re-established, NetWare will force a complete remirror.

Another advantage, therefore, to the NVB and SmartAek system on the Off-SiteServer V.35 is that temporary communication line failures will not result in a potential loss of mirror. This is because the local NetWare server will be unaware of any problem until the local NVB either becomes full or has reached a user-determined level.

Communication Interfaces
The original Off-SiteServer V.35 release incorporated an internal CSU/DSU and was limited to a T1 interface. The current version provides a common V.35 interface and allows connection to a number of communications channels, such as T1/E1, fractional T1/E1, 56 CBS, ISDN, etc. In addition, there is V.35 compatible equipment available which will interface to ATM, Ethernet, Token Ring, and FDDI.

System Requirements (System Check List)
A typical installation using Off-SiteServer V.35 requires the following elements:

- NConsole program data returned to MiraLink for analysis (see following section)
- One pair of Off-SiteServer V.35 units
- One pair of EISA Vinca StandbyServer 32 link cards
- One pair of V.35 CSU/DSU high speed modems, matched to interface with the dedicated line you have installed (56k, T1, etc.)
- A high speed line installed between primary and backup sites. The line speed is determined by the NConsole data analysis.
- One EISA off-site server to receive mirrored data from the EISA primary server. The disk drive capacity of both servers must be equal in size, and of similar configuration (i.e., Raid 5, etc.). Ideally, the off-site server should be equal in performance capability to the primary server, but this is not required.

Determining Communication Bandwidth Requirements
An analysis needs to be performed on a server to determine how much average traffic or activity takes place on the system. MiraLink provides a free software program from Avanti Corporation for companies wishing to run this analysis. This program, NConsole, comes with a free 30-day evaluation license. It is available from Avanti's web site.
MiraLink suggests that a company run Nconsole for at least a week and then send the collected data to MiraLink for analysis. This can be done either by mailed disk or through our web FTP site. Please see MiraLink's web site (under server evaluation) for complete details.

Please note. MiraLink and Off-SiteServer V.35 are trademarks of MiraLink Corporation. All other brand and product names mentioned herein are trademarks or registered trademarks of their respective holders.

The information found in this Technical Review is for conceptual analysis only. MiraLink believes that all descriptions, reports and statements contained herein are true, but makes no claims as to

their definitive accuracy.

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Data Sheet

Off-SiteServer V.35™

NetWare File Server Mirroring Over High Speed Communication Links

Off-SiteServer V.35 is the premier product for real-time mirroring of data to a file server at a remote site. It provides a cost effective solution for the client/server arena while yielding true wide area network fault tolerance.

Provides a high level of fault-tolerance to the enterprise network.

Complements existing back-up strategies and "hot site" strategies.

Reduces reliance on back-up tape storage without requiring users to log off the network. Encourages disaster prevention and recovery efforts.

Utilizes SmartAck technology (hierarchical pre-acknowledge), to reduce dirty cache buffers and maintain LAN performance.

Maintains mirroring in the event of a temporary line disruption.

Provides diagnostic information via keypad and LCD display.

NLM utility inhibits disk reads to remote server to improve network performance.

Using standard disk mirroring under Novell's NetWare™, Off-SiteServer V.35™ mirrors all files down to the transaction to a remote site, via standard telecommunication lines or routable protocols. Once this mirror is implemented, the remote server is essentially a duplicate of the host NetWare™ server. All files, including open, closed, bindery, etc., are mirrored across a high speed communication link. In the event of a main server failure, the remote server can be started as a NetWare™ server with up-to-date file information in a matter of moments.

Data Communications LAN Times BEST OF SHOW 1995 LAS VEGAS

Integral to Off-SiteServer is the SmartAck™ (smart acknowledge) system, in combination with our non-volatile buffer, provides the key to minimizing dirty cache buffers and outstanding disk requests during periods of heavy activity. The SmartAck™ system also allows the selected communication channel to operate in the background, non-obtrusive to the host server.

Working in accord with our SmartAck™ system, MiraLink™ has an NLM that inhibits disk reads over the wide area network. This NLM, developed jointly with Novell, reduces traffic and helps improve network performance.

The V.35 output of the Off-SiteServer units provides a myriad of options with regards to a preferred communications channel interface. Through an external CSU/DSU or compatible bridge these units can interface to: ATM, T1/E1, Fractional T1/E1, ISDN, Frame Relay, Ethernet, FDDI, Token Ring, etc. Twisted pair connections up to 5,000 ft. can also be

supported.

Our second generation interface allows the network administrator to directly control many of the Off-SiteServer's functions through a user friendly menu based touchpad. These controls allow direct monitoring of performance as well as customized configuration.

The standard Off-SiteServer V.35TM configuration consists of a pair of rack-mountable devices, interface cables, VincaTM StandbyServer32TM link cards and software.

Specifications

Total System Throughput
MAX (with T1 lines): up to 560Mbytes/hr
MIN (with 56Kbps): up to 18Mbytes/hr

Interfaces
Novell NetWare: ver 3.x and higher
User interface: V.35 DTE, Keypad, LCD, LED
Data interface: Via DB25 (EIA-530) Connector

Electrical
Operating voltages: 120/240VAC, 60/50Hz
Power consumption: 37W

Dimensions
2U rack-mount: 3.5 x 18 x 19 inch housing

Buffer
NonVolatile: 850MB

Configuration Diagram

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Press Comments

Off-SiteServer V. 35

NetWare File Server Mirroring Over High Speed Communication Links

"Having a mirrored NetWare server next to your main machine will be of enormous benefit should your main server fail. But it the building catches fire, or the roof collapses, both servers will be destroyed. If it's essential to get your company up and working immediately after a total disaster, you're going to have to create a complete office environment at a remote site. MiraLink's Off-SiteServer V.35 can help you do just that.

"Off-SiteServer is aimed at companies that can't afford to lose business due to fire, flood and other catastrophes. It's not cheap, but it it's the difference between going out of business and surviving, cost won't be an issue."
Louise Lindop *PC Magazine UK July, 1996*

"Because MiraLink's Off-SiteServer buffers the data, such low-speed WAN links as 56k bps, ISDN or fractional T-1 lines may be used. Therefore, cheaper WAN connections can quickly pay back the cost of the expensive MiraLink hardware. Enterprises with infrequent but massive spikes of data mirroring, such as with database downloads, do not need high WAN bandwidth for Off-SiteServer.

"Just for kicks, we vandalized the WAN link (by pulling out a cable) to see what Off-SiteServer would do. It merely noted that the link was down and continued to buffer the data. We even swapped a 56K bps link for a T-1 in midstream, then back again, with no ill effects. We were impressed." **"Skirting Server Disaster" Ken Phillips** *PC Week June 17, 1996*

"Off-SiteServer provides NetWare installations with a unique way to distribute server tolerance across the wide area network, using anything from analog dial-up lines for near-real-time backup to T-1 links for actual server mirroring. By enabling centralized backup of multiple remote sites and protecting users from disasters at a particular location, Off-SiteServer makes the PC-LAN environment a more robust platform for business-critical applications."
Susan Breidenback *Editor in Chief LAN Times April, 1995*

"For network managers, ensuring server uptime is the chief challenge of their jobs: natural disasters, criminal acts, human error, parts failures and just plain bad luck can all bring a network to a crashing halt. For peace of mind and complete protection...the most thorough solution is to clone a vital server, either across the campus for local fault tolerance or off-site for full-blown disaster recovery.

"MiraLink Corp., maker of the WAN-based

Off-SiteServer V.35, solves the WAN bandwidth problem by first buffering all mirror requests to a large hard disk in MiraLink's box. Even if the WAN link fails, mirroring can still occur at top speed as a local disk mirror. The buffer also makes it possible to use low-speed WAN connections, down to 56k bps, thereby saving money on the corporate communications bill."
"For safety, nothing beats server cloning" *Ken Phillips PC Week June 17, 1996*

"If you could foresee a disaster coming to your customer's network, would you: a) make sure all the backups were done and bring a set of archive tapes off-site; b) install a standby server in a mirrored configuration: or c) install a standby server in a mirrored configuration at your own office and let it work remotely?

"If you think the third option sounds good, check out Off-SiteServer V.35, a solution developed by MiraLink in conjunction with Vinca and Novell. Off-SiteServer V.35 lets you build a mirrored file server environment using telecom channels or routable protocols. Building such an environment is not as tricky--or costly--as you might think."
"Stand By, Remotely" *Dave Brambert Network VAR January, 1996*

"MiraLink's Off-SiteServer works with Vinca's StandbyServer hardware and software to allow the remote server to be a distant site. That capability is 'particularly attractive for disaster-recovery purposes,' say Robert Janusaitis, a consultant with BSG Consulting in Houston. 'After the World Trade Center (bombing), a lot of people will want this capability,' adds Paul Mason, research mgr., system level software at International Data.
"NetWare: Higher Availability at Lower Cost" Paul Strauss *Datamation Nov. 15, 1994*

"Off-SiteServer includes software and two rack-mountable units. One unit remains at the host site and is connected to the second, a remote unit, via a dedicated T1 or E1 telephone line, making the system safe from any disaster that may befall the host area. 'Right now there are a lot of mainframe and minicomputer products that do what this does, but Off-SiteServer is relatively unique in a LAN environment,' said Jim Greene, an analyst with BIS Strategic Decisions, in Norwell, Mass."
"MiraLink Mirrors Servers for Real-time Access" Cate T. Corcoran *Info World September 19, 1994*

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Hard disk make/model number:

Hard disk partition size:

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Description of problem:

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Manufacturer/Model number:

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How to Get More Information

Included Product Trial Offer

MiraLink has the only patented technology which, in a cost-effective and practical manner, enables disaster recovery of critical data at the network operating system level.

To receive more information directly from MiraLink or by mail:
Hours -- 9:00A.M. to 5:00P.M. Mountain Time Monday through Friday
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Phone -- (801) 575-LINK (5465)
Fax -- (801) 532-LINK
E-mail -- pford@miralink.com

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